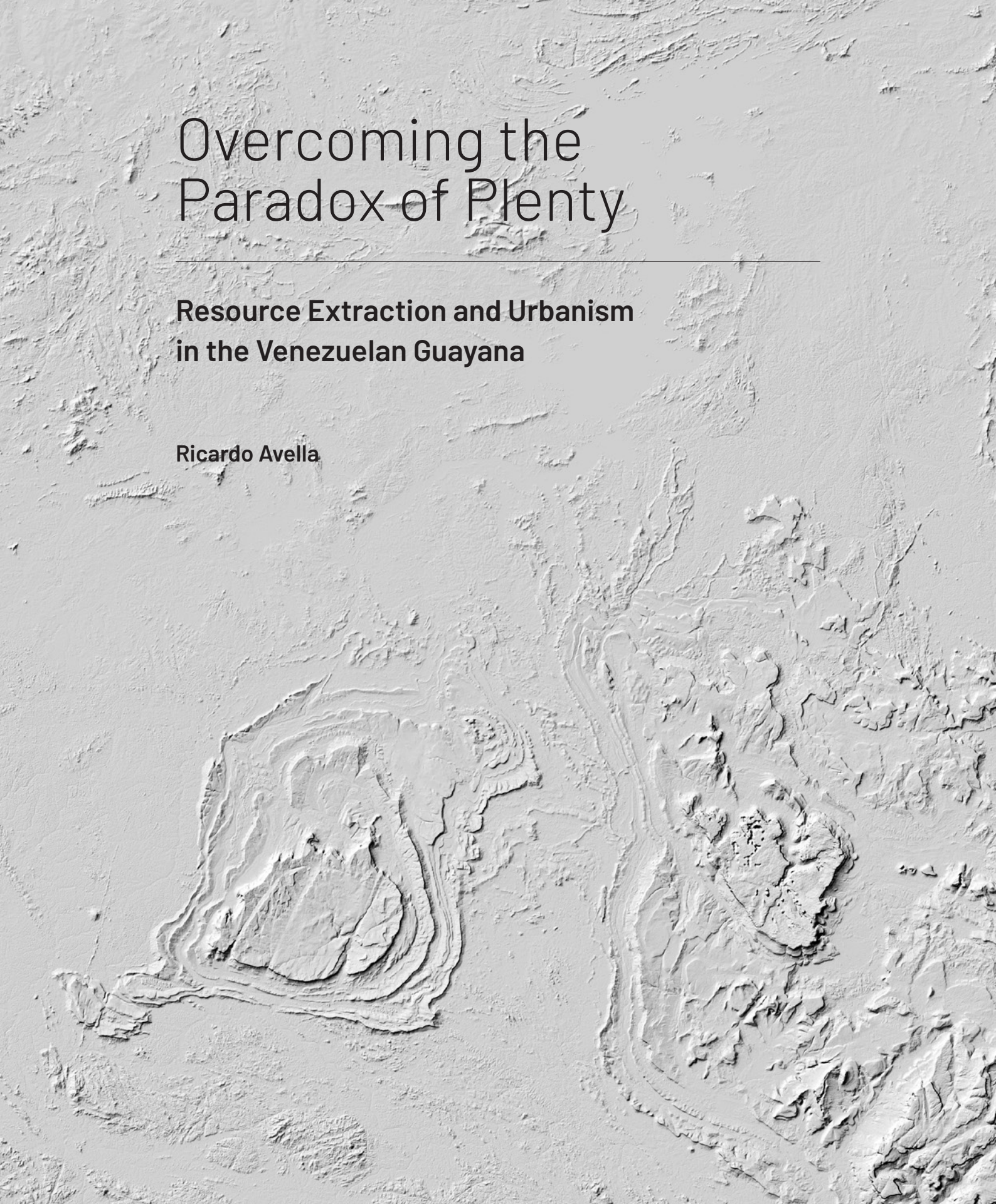
Overcoming the Paradox of Plenty

Resource Extraction and Urbanism in the Venezuelan Guayana

Ricardo Avella



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“El país, decíamos,
lo poníamos en las mesas,
lo cargábamos a todas partes,
el país necesita,
el país espera,
el país tortura,
el país será,
al país lo ejecutan,
y estábamos allí por las tardes
a la espera de algún doliente
para decirle
no seas idiota
piensa en el país.”

[Miyó Vestrini • IX, El Invierno Próximo]

“No la llevamos en oscuros amuletos,
Ni escribimos arrebatados suspiros sobre ella,
No perturba nuestro amargo sueño,
Ni nos parece el paraíso prometido.
En nuestra alma no la convertimos
En objeto que se compra o se vende.
Por ella, enfermos, indigentes, errantes
Ni siquiera la recordamos.

Sí, para nosotros es tierra en los zapatos.
Sí, para nosotros es piedra entre los dientes.
Y molemos, arrancamos, aplastamos
Esa tierra que con nada se mezcla.
Pero en ella yacemos y somos ella,
Y por eso, dichosos, la llamamos nuestra.”

[Anna Akhmatova • La Tierra Natal, versión de María Fernanda Palacios]

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But this research would not have been possible without the help of many people in Venezuela, to whom I offer my sincerest gratitude. Their unrestricted and unlimited support made me realize that there is a strong desire to overcome the unfortunate situation in which we are today as a nation. They helped me without expecting anything in return, and I believe they did it because we all want to understand how a more sustainable future can be shaped for our country. I am particularly grateful to Carlos Peláez, who supported me from the early beginnings, and to José Rafael Lozada for all his help and sharp observations to my writings. But I also want to thank a number of journalists, entrepreneurs, professionals and politicians with whom I had the pleasure to talk to. The exchanges I had with them helped me to grasp the complexity and the potential of the region. For this reason, I want to acknowledge the help of Jeanfreddy Gutiérrez Torres, Luis Jiménez Puyosa, Edgard Yerena, Jorge Alejandro Naveda Sosa, Paolo Patritti, José Antonio Jraige and Rafael Saavedra.

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Preface

The motivation to choose this topic is born from the frustration that comes to me every time I think how a country like Venezuela, until very recently a reference in Latin America, ended up with its productive capacity destroyed and with its people impoverished and surviving in critical conditions. To understand how this came to happen we need to talk about politics and economics, about failed institutions and the desire of a group to remain in power by all means necessary. But we would also need to talk about the long Venezuelan tradition of solely relying on resource extraction to support the national economy. In recent years, the national government shifted its attention from the oil fields of the country to the forests of the Venezuelan Amazon, where large deposits of iron, bauxite, gold, diamonds, copper, cobalt, and other rare minerals can be found. Once again, the country puts all its efforts and resources in the exploitation of something that lies underground and that has not been produced with the knowledge and capacities of its people.

But to deal with resource extraction in a developing country like Venezuela has made me realize that there are no easy solutions to this problem. The environmental, social and economic externalities of this type of economy have profound and long-lasting consequences that will be felt by many generations to come; but it is also true that in many parts of the world extraction has provided a way to boost and diversify the national economy when properly managed, allowing many resource-rich countries to make use of the mining revenues to improve the living conditions of its people. In addition, the profitability of some types of resource extraction difficults the success of alternative and more sustainable forms of economy.

The fact that the Venezuelan Guayana is a peripheral region, with little population densities, and in the middle of the Amazon rainforest, does not make the issue easier to apprehend. In fact, it has led many to believe that this is a problem that would be better managed by activists, environmentalists, economists and politicians. But during the course of the EMU studies I have come to understand that deforestation in the Amazon, the polluted tailing ponds that miners leave behind, and the dependence on resource extraction of those who subsist in these neglected and unstable parts of the world, are unquestionable urban problems that derive from global pressures. This dimension, which can be related to the planetary urbanization phenomenon, only adds more complexity to the issue. Thankfully, the EMU Post-Master in Urbanism programme provides students with tools to deal with uncertainty. The construction of scenarios, and the use of design as a research tool that can produce valuable knowledge, are just some examples of the skill set that is offered over the course of the programme. In a context in which the role of the architect and the urbanist has been marginalized (Viganò, 2016), it is critical (or at least valuable) to understand what we can say as urbanists in the discussion of the future(s) that a resource-rich country may have. And I believe that our contribution, which considers the spatial dimension of the problem, is a fundamental one that others are not able to provide.

PART 1

Understanding Extraction

Global pressures, local externalities

**"Ten years from now, twenty years from now,
you will see, oil will bring us ruin...
We are drowning in the devil's excrement"**

[Juan Pablo Pérez Alfonzo, Venezuelan minister and OPEC founder, in 1973]

"We *made* this fragility and these deaths"

[Saskia Sassen, Expulsions]

"The country that has the resources can say "No" to mining"

[Mel Watkins, Unsettling the Mining Frontier]

FIG. 1.1 The discovery of iron ore deposits in the Venezuelan Guayana prompted the construction of several company towns by American mining corporations during the 1940s. Some years later, the democratic government of Rómulo Betancourt decided to plan the industrial new town of Ciudad Guayana to diversify the national economy, based on the extraction and processing of natural resources. In this image, the iron ore deposits of San Isidro, near the new town of Ciudad Piar. Retrieved from https://clarknow.clarku.edu

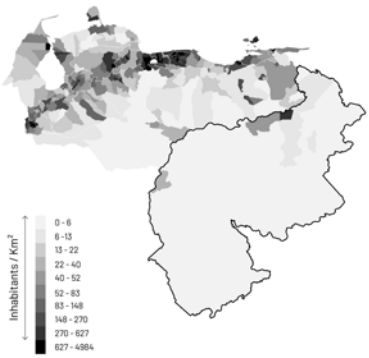

FIG. 1.2 Situation of Venezuela, in the northern part of South America. Source: made by the author.

FIG. 1.3 The Venezuelan Guayana is the largest and least populated region of the country, south of the Orinoco River. Source: made by the author.

FIG. 1.4 The Orinoco Mining Arc, created in February 2016, accounts for 12% of the total surface area of Venezuela. Source: made by the author.

1 – Introduction

1.1 – **Problem Statement and Motivation**

The 'resource curse', a term coined by Richard Auty in 1993, refers to the paradox that the abundance of natural resources tends to have adverse effects in a country's economic, social and political well-being (Ross, 2015). This correlation between the abundance of fossil fuels or minerals and the underperformance of a country has also led many to refer to this phenomenon as the 'paradox of plenty'. When a country depends exclusively on the extraction of non-renewable resources it faces a wide range of social, political, economic and environmental risks that can be extremely difficult to manage, since they are created by powerful external factors. One of these risks is the vulnerability of such a country to the fluctuations of commodities in the global market. And Venezuela, a nation that has mainly depended on oil and mineral extraction since the 1920s, has not been the exception. Indeed, the price of oil and the country's economy go hand in hand. When oil prices are high, an illusion of wealth is created, and the country enjoys good economic times. But when oil prices drop, austerity measures are needed, and economic disaster follows.

This extreme dependency on oil extraction was particularly strengthened over the past two decades. The Bolivarian Revolution that was set in motion in 1999 destroyed the productive capacity of the country by weakening the private sector with thousands of arbitrary expropriations, and by neglecting the state-owned steel and aluminum industries of the Venezuelan Guayana (Prat, 2012; Abd & Smith, 2018). With Hugo Chávez, Venezuela became more dependent than ever on oil exports, and his government condemned its people to live in a very fragile and vulnerable nation. During the 2000s commodities boom, when oil prices were astonishingly high, this state of fragility could not be felt. Economic mismanagement and widespread corruption were almost unnoticeable due to the immense revenues brought by oil for more than a decade. But when oil prices dropped in 2014, inflation rates escalated, shortages and scarcity became more common, and living conditions deteriorated. Full of debts and accustomed to a rentier model, the central government suddenly needed a new source of revenues.

This is why in 2016, the government of Nicolás Maduro shifted its attention to the Venezuelan Guayana, a vast and forested region that lies south of the Orinoco River, where Europeans believed the golden city of El Dorado was located. Great quantities of iron ore and bauxite can be found there, but also gold, diamonds, cobalt, and many other rare minerals. For this reason, the president created the Orinoco Mining Arc, an immense area of concession blocks opened for the extraction of natural resources, which covers 110 thousand square kilometres of savannas and tropical moist forests in the northern part of the Venezuelan Guayana. It is the largest mining project in Venezuelan history. Fortunately, only a few concessions have been formally given to extractive companies so far. But in the meanwhile, and especially since 2004 (Lozada, 2016), the number of illegal small-scale gold mining operations has soared dramatically and continues to increase to this day.

FIG. 1.5 Bauxite ore is extracted in Los Pijiguaos by state-owned CVG Bauxilum. Then it is transported by boat through the Orinoco River to the processing mills of Ciudad Guayana, more than 600 kilometres away. Retrieved from http://www.bauxilum.com.ve

FIG. 1.6 Derailed and abbandoned wagons that used to carry iron ore from the extraction site in Ciudad Piar to the processing mills of Ciudad Guayana. Photograph taken by Rodrigo Abd. Retrieved from https://apimagesblog.com

FIG. 1.7 Today, illegal small-scale gold mining is the main source of employment in remote and peripheral areas of the Venezuelan Guayana. According to the International Crisis Group (2019), an estimated 300,000 miners are working in the region. Photograph taken by Juan Barreto. Retrieved from https://correspondent.afp.com

The astronomical rise in the prices of various metals over the past two decades –iron, aluminum and especially gold, to name a few– has a direct connection to the demand of fast-growing economies like China or India. This trend puts great pressures on resource-rich countries all over the world, especially in the global south. In the Amazon basin, for example, illegal small-scale gold mining is a widespread phenomenon (RAISG, 2018). But in Venezuela, the combination of those external factors with the ongoing economic crisis and the subsequent lack of opportunities throughout the country, has been particularly catastrophic. The profitability of this extractive activity has promoted the escalation of illegal small-scale gold mining in the Venezuelan Guayana. And thousands of people have found in the gold mines of the region a way to subsist and palliate the crisis.

In the past, when the steel and aluminum industries of Ciudad Guayana, Ciudad Piar, and Los Pijiguaos were more productive; when industrial and legal gold mining was operated by the state in El Callao; when livestock farming and logging businesses flourished in Upata, Guasipati, and Tumeremo; and when conditions supported tourism in the Gran Sabana Municipality, illegal small-scale gold mining was much less widespread. It could be argued that the existence of employment opportunities has a positive impact in the control of illegal gold mining, but this activity has existed for more than 170 years (Lozada, 2016), and its presence has always been stronger in peripheral and remote areas where gold veins and alluvial gold placers can be found. Therefore, if anarchic gold-mining activities are to be controlled and the richness of the Venezuelan Amazon is to be preserved, it becomes crucial to generate new economic activities in these areas as well. The question is: what kinds of alternatives should be promoted, and how? The choices made in the past, during democratic times, had a positive impact on the improvement of living conditions in the region. But those choices were always based on the exploitation of non-renewable resources. This is why this research will focus on exploring the challenges and opportunities for a transition towards a more sustainable development path.

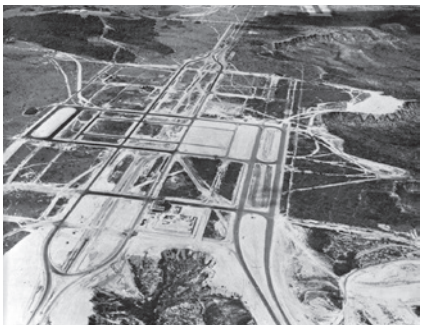

FIG. 1.8 Aerial view of the new city center of Ciudad Guayana, in the sector of Alta Vista, during its construction in the 1960s. Source: Rodwin, 1969.

FIG. 1.9 Lloyd Rodwin coordinated the making of the plan made by the Harvard-MIT Joint Center for Urban Studies during the 1960s. Source: Vale, 2008.

FIG. 1.10 The steel mill of Matanzas in Ciudad Guayana, managed by the CVG. Retrieved from https://latin_america.academic.ru

1.2 – **Research Question**

Dependency on resource extraction is having far-reaching consequences in the Venezuelan Guayana that will be felt by many generations to come, especially in remote and peripheral areas. In addition, the idea of maintaining a model based on the exploitation of non-renewable resources hinders the possibility of a sustainable future. But is there a way out of the resource curse? And more importantly, does urbanism have a role in the development of a transition plan in peripheral and resource-rich regions? These are extremely sensitive issues that are usually dealt in the realm of politics and economics, but there is a spatial dimension to the problem that should not be underestimated. History shows that the restructuring of the economy goes hand in hand with the restructuring of the territory. The shift from an urban model of development to an agrarian one in Western Europe, after the fall of the Roman Empire, is a good example that illustrates this point; or the transformation of the hinterland beyond the Venetian lagoon by the aristocracy of the maritime republic, once the port cities of the North Sea took over the primacy on trade and commerce that was previously enjoyed by the Mediterranean. These examples evidence that there is an important spatial dimension to both economic and political restructuring. So, if a transition towards a more sustainable form of development is to be promoted in the Venezuelan Guayana, then the exploration of its spatial implications becomes fundamental. This appreciation sets the base for the main research question of this work:

Can the restructuring of the territory create the conditions for a diversified and sustainable economy, reducing the current dependence of this resource-rich region on extraction?

The Venezuelan Guayana has already been the stage of an important and ambitious project of economic restructuring during the second half of the twentieth century, when the democratic government of Rómulo Betancourt set out to industrialize the country and overcome import dependency in 1959. The strategy, strongly rooted in a neo-extractivist and developmental economic model, placed a particular interest in the potential of this region to diversify the national economy (Almandoz 2016; Angotti 2001). The iron and bauxite deposits of the Venezuelan Guayana, along with its incredible potential for hydroelectric power and the ease of accessibility to the Atlantic Ocean through the Orinoco and its delta, made the largest and least populated region of Venezuela a desirable location for the state-owned investments (Snyder, 1963). A group of planners from the Harvard-MIT Joint Center for Urban Studies was hired to study the spatial implications of this project, and a state-owned regional development corporation was created to implement their plan. Ciudad Guayana, an industrial new town on the banks of the Orinoco River, was the result of this fascinating experience. And for more than 40 years, its productive industrial platform provided stable employment for thousands of people, considerably improving living conditions throughout the region (Angotti, 2001; Prat, 2012).

Ciudad Guayana, a new city on the Orinoco

Rafael Alfonzo Ravard was appointed as the first president of the CVG in 1960. He had graduated from the Massachusetts Institute of Technology, and this prompted him to hire the services of the Joint Center for Urban Studies of MIT and Harvard University to develop the plan for a new industrial city in the Venezuelan Guayana. The team was led by Lloyd Rodwin, and among the professionals that came to work in Venezuela with him were Donald Appleyard, John Friedmann, Lisa Peattie and Willo von Moltke. All of them had a Venezuelan counterpart in the planning team, and their task was to link the potential of the region and the new industrial city that they were planning with the national economic strategy set out by president Rómulo Betancourt, strongly rooted in an import substitution industrialization (ISI) trade and economic policy (Almandoz 2016; Rodwin, 1969; Appleyard, 1976).

The plan proposed a central spine that stretched from the existing town of San Félix in the east to the new town of Puerto Ordaz in the west, crossing the Caroní River with a new bridge. To boost the development of the western bank and the integration of the two centralities, the group of planners proposed the creation of a CBD called Alta Vista, close to the expansion of the industrial area of Matanzas. The new groth pole of Ciudad Guayana was a partial success, as it stands today as the sixth most populated city in the country even though it did not grow as the planners forecasted. But regarding the diversification of the national economy, Ciudad Guayana was a very successful enterprise for more than 40 years. Although it was rooted in the extraction of natural resources, it created the conditions for a productive economy that went beyond extraction (Prat, 2012).

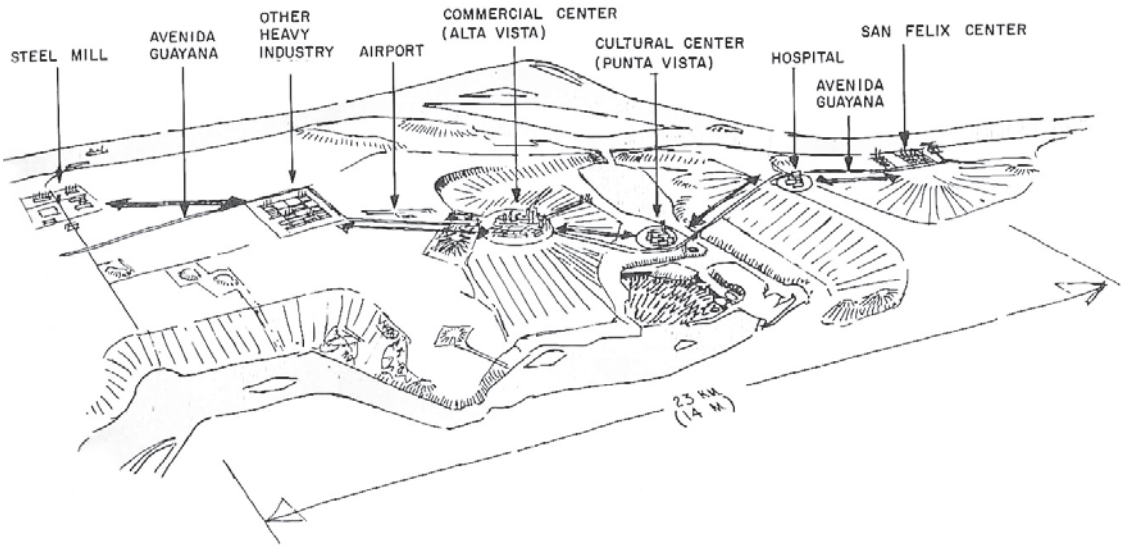

FIG. 1.11 During the 1960s, an ambitious project was made for the restructuring of the Venezuelan Guayana. In this image, the physical concept for the industrial new town of Ciudad Guayana, drawn by Willo von Moltke in 1964. Source: Appleyard, 1976.

FIG. 1.12 Aerial view of Ciudad Guayana, the largest city of the region (previous page). In this image, the Caroní River flows into the Orinoco, close to one of the industrial ports used by the state-owned mining companies. Retrieved from http://aiesec.org.ve

Such a bold project, designed by a small group of experts and implemented from the top-down, would be extremely difficult to replicate nowadays for a number of reasons. And even though it proved to be successful and brought a great deal of benefits to many people, its reliance on the existence of non-renewable resources leaves room for questions in the context of climate-change. If dependence on resource extraction is to be overcome, and a project for a transition is to be designed, things must be done in a different way. What kind of project should be made for the Venezuelan Guayana today? And for whom? As mentioned above, illegal small-scale gold mining has a stronger presence in remote and peripheral areas of the Venezuelan Guayana, where communities have limited access to other forms of employment. Indeed, poverty and lack of opportunities have a direct correlation to deforestation in the fragile context of the Amazon basin (Dourojeanni, 1999). All these considerations, along with the main line of inquiry of this work, derive in the following sub-research questions:

What are the different degrees of peripherality within the region? And are all peripheral areas equally dependent on resource extraction?

Are development and preservation in conflict in peripheral areas of the Amazonia?

What kind of development should be promoted? And what notions of preservation must be stimulated?

What is the role of urbanism in remote and peripheral areas of the Amazonia?

These are some of the questions that this research will try to answer, hoping that the findings may contribute to the important debate on transition design in resource-rich countries of the developing world. But also, to the current debate on what kind of future is to be promoted in Venezuela.

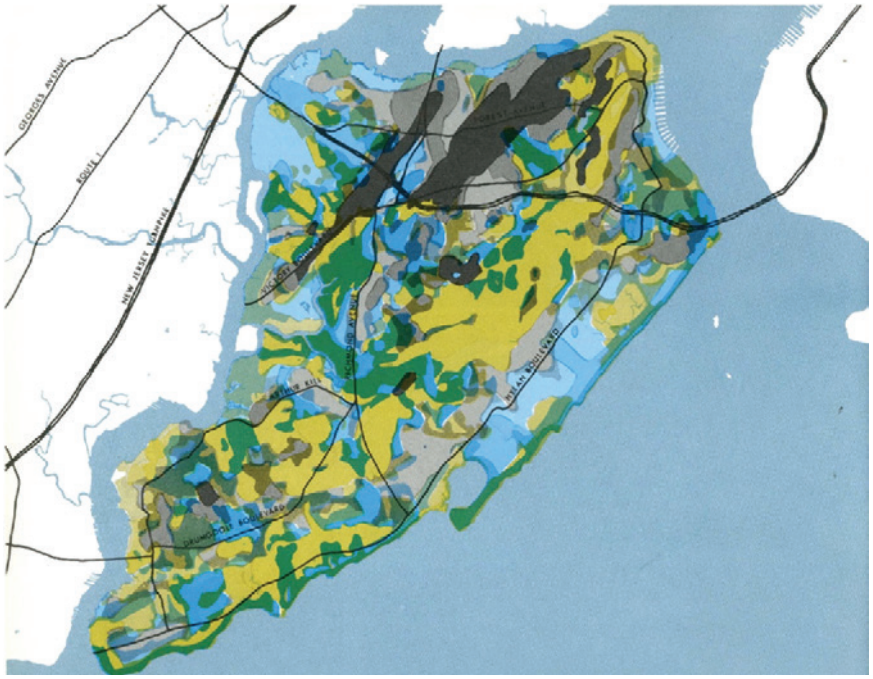

FIG. 1.13 Composite map of a study for Staten Island, made by Ian McHarg. This is the end product of the suitability assessment he describes in Design with Nature (1971), obtained by overlaying several conclusion maps on a variety of themes. Source: McHarg, 1971.

1.3 – **Research Design and Methodology**

This research is based on regional strategic planning approaches, and for this reason the work has a certain structure that guarantees a certain coherence. But the vast size of the region, time limitations, lack of data, the impossibility to travel to the Venezuelan Guayana and perform field research, the peripheral condition of the region, and the problem framed by the research question, led to make important variations to the approach in order to answer the main research question. It must be said that even though the research is described as a linear process, it was rather iterative. On several occasions concepts and theories needed to be revised and re-evaluated for different purposes, analyses had to be re-framed, and specific interventions re-formulated. Nevertheless, the description of the structure of the present work may help others to improve the approach for future research.

The first part seeks to understand the rationale behind extraction and its relationship with global trends. A literature review was made to comprehend what are the drivers that move people, companies and nations to engage in resource extraction, its processes and techniques, and the externalities it creates from an environmental, social and economic point of view. Planetary urbanization theory (Brenner, 2014) helped to understand that global pressures have very concrete consequences on specific places around the world; a phenomenon that serves to clarify that deforestation processes in the Amazon, even in remote and peripheral areas, are unquestionable urban problems. This research was also complemented with the identification of some trends and drivers that explain the rise of illegal small-scale gold mining in the specific context of the Venezuelan Guayana. Analysis and mapping exercises at the regional scale were made to give a spatial dimension to the problems, facts and figures that derived from the literature review.

An investigation of relevant comparative references throughout the Americas was also made, to identify strategies, mining policies and financial mechanism that are being used in several countries to deal with resource extraction. Some are trying to shift from 'extractivism' towards other forms of economy, others are trying to deal with the harmful byproducts of extraction, and a few integrate mining into national economic strategies to improve the living conditions of people with mining revenues. This literature review helped to comprehend what are the opportunities, limitations, and eventual trade-offs that a resource-rich region has in the global context; but it was also useful to benchmark Venezuela in a larger context. From this analysis a series of lessons were learned which proved to be useful in subsequent phases of the research.

The second part deals with the understanding of the territory. To make a categorization that could be used for further research and interpretation, a regional scale analysis was made using a series of indicators that were carefully selected. The method used for the analysis takes from the suitability assessment described by Ian McHarg in 'Design with Nature' (1971), since four different themes were evaluated through a series of maps that spatialized relevant aspects of the region. All the maps were ranked individually using a scale of values, and this method gave an idea of which are the most -and least- suitable areas for certain functions; which are the places where certain aspects have a greater impact; or which are the areas where certain activities have a greater concentration. These maps were then overlaid according to their themes with the Map Algebra tool in ArcGIS; and the resulting composite maps helped to recognize the spatial distribution of different problems in different areas of the Venezuelan Guayana.

The themes chosen for this regional scale analysis were Peripherality, Extraction, Nature and Occupation. The names may seem very generic, but that is because the specificity of the analysis is related to the set of indicators used to measure each theme. For example, the variables used to measure peripherality were the level of integration of each parish (the smallest administrative unit) to the national road network; the road density of each parish; their level of accessibility to health and secondary education facilities; their population density, used to measure to what extent an individual has access to other people; and the number of airports that can be found in each municipality. The overlay of these different variables resulted in a peripherality index, which was regarded as the most important composite map of the regional scale analysis. It revealed that even if the Venezuelan Guayana is a vast and peripheral region with extremely low densities, there are integrated and accessible areas with large cities in the north, peripheral towns with low accessibility to basic services, and remote settlements that can only be accessed by boat or small planes. The indicators used to measure the other three themes are explained in detail in chapter four, but the different conclusion maps that resulted for each one of them were all overlaid against the peripherality index map. This was the final step of this systematic process, and it proved to be useful to categorize the region according to the conflicts and opportunities that certain areas present.

The regional scale analysis evidenced that illegal small-scale gold mining activities and their harmful byproducts are mostly concentrated in peripheral and remote areas of the Venezuelan Guayana. Therefore, a literature review was made on endogenous growth theory to understand what needs to be done to promote

Research Question

Can the restructuring of the territory create the conditions for a diversified and sustainable economy, reducing the current dependence of this resource-rich region on extraction?

Motivation

I wsih to understand what is the role of urbanism in peripheral resource-rich regions of the Amazonia. But also, I would like to understand what are the spatial implications of a transition towards more sustainable forms of economy in these sensistive contexts.

Relevance

This is a crucial topic for the future of Venezuela, since its economy has solely relied on the extraction of natural resources since the beginning of the twentieth Century. This trend has created a wide range of political, social and economic problems that hinder the possibility of a sustainable future for the country.

Sub-Research Questions

Conceptual Background

What is the rationale behind extraction?

What opportunities, limitations and eventual trade-offs has a resource-rich region in the global economy?

Are development and preservation in conflict in peripheral areas of the Venezuelan Guayana?

What is endogenous growth?

What is polycentricity?

Analysis

What are the impacts of the extractive economy in the Venezuelan Guayana?

What are the different degrees of peripherality within the region?

Are all peripheral areas equally dependent on resource extraction? Or equally vulnerable?

Is there potential in this region to develop endogenous growth and stimulate other forms of economy?

Design Explorations

What kind of development should be promoted? And what notions of preservation must be stimulated?

What spatial strategies could we promote to stimulate the generation of new forms of economy?

What conditions need to be created to facilitate the growth of local initiatives from the bottom-up?

What is the role of urbanism in remote and peripheral areas of the Amazonia?

FIG. 1.14 Main research question, sub-research questions that derive from the main one, and the different methods and outcomes associated to each question. Source: made by the author.

Methodology	Outcomes
Literature review.	*A new perspective on planetary urbanization processes.*
Investigation of comparative references across the Americas to benchmark the Venezuelan situation.	*A catalogue of strategies, mining policies and financial mechanisms to deal with resource extraction.*
Investigation of local initiatives in the the Venezuelan Guayana that create alternatives to resource extraction.	*A catalogue of initiatives that offer a new perspective on the challenges and opportunities of the region.*
Literature review.	*A set of principles to promote local development.*
Literature review.	*A set of principles to stimulate rural regional planning.*
Literature review, and visualization of the externalities of extraction in the region with GIS-software.	*A cartographic atlas of resource extraction in the Venezuelan Guayana.*
Regional scale analysis and categorization, using a series of indicators to create a composite map.	*A peripherality index map of the Venezuelan Guayana.*
Regional scale analysis, to create a series of composite maps that will be overlaid to the peripherality map.	*A visualization of the spatial distribution of different problems and opportunities throughout the region.*
Literature review.	*A new perspective on the potential of the territory to support a number of new green jobs.*
Construction of a scenario matrix, to visualize several possible scenarios for the future.	*A vision statement, a set of goals, and a regional strategy for the Venezuelan Guayana.*
Selection of a case study to test the vision with a demonstration project. Analysis of its affordances.	*A set of policies and interventions that will help to activate a polycetric urban region.*
Selection of one intervention, and exploration through design of different alternatives for its development.	*A spatial framework capable of adapting to changing circumnstances and stakeholder arrangements.*
Benchmark evaluation of the demonstration project to assess the impact of the vision in the region.	*A reflection and a series of reccommendations for further research in the Amazonia.*

local sustainable development in the region; but also, to reduce the exposure of peripheral communities to external pressures. The investigation provided a theoretical framework to the work and led to an additional literature review on the potential of the natural and cultural resources of the Venezuelan Guayana to support alternative economies. It could be argued that the main objective of this part of the research was to understand if it was possible to shift from a vicious cycle of dependence on resource extraction towards a sustainable virtuous cycle of self-reliance; where development is promoted locally, and initiatives grow from the bottom-up.

The third part of the research presents an investigation on local initiatives that already offer an alternative to resource extraction in the Venezuelan Guayana. Interviews with the promoters of some of these initiatives was fundamental, since they provided a better understanding of the challenges they are facing as entrepreneurs. Then, a scenario matrix with several possible futures was built by making use of the research made up to this point. But due to time limitations, only one of them could be explored in detail. The scenario that was chosen promotes local sustainable development in a region where mining has been banned, and which favours productive activities that make a sustainable use of renewable resources. This scenario was chosen over others for a number of reasons, but these will be explained in detail in chapter seven. What matters is that within this scenario, a vision statement for the Venezuelan Guayana was formulated to frame the design explorations that followed. The vision statement was also complemented with a set of strategic goals and with the enunciation of a regional strategy. Although the vision provides a direction for the future, the scenario matrix evidences that this is simply one among several possible paths. The decision to work with scenarios and to abstract the problem in such a way helped to explore with complete freedom one possible future among many others. This decision also explains why other possibilities, such as the promotion of legal and controlled forms of mining, was not considered in this research.

In the fourth part of this research, a specific case study was selected to test the potential of the vision with a demonstration project. A linear cluster of mining towns along the regional trunk road that stretches to Brazil presented a series of factors that contributed to its selection among many other options. First, it is in a peripheral part of the Venezuelan Guayana, and the three towns are among the illegal small-scale gold mining hotspots of the region; second, the area is in a fragile environment of tropical moist forests with great potential for supporting other forms of economy; and third, the morphological structure of the cluster presents a set of particular conditions that differentiate them from other mining towns along the same trunk road, and that can be associated with the polycentric urban region model. For this reason, a literature review on polycentricity theory was made, to understand what needs to be done if a polycentric urban region is to be activated. Investigation revealed that such a model has the capacity to enhance the economic performance of the cluster by taking advantage of the existing spatial conditions and by promoting collaboration and complementarities among the centres. Then, the principles of endogenous growth theory and polycentricity theory were operationalized in the demonstration project. Framed by the vision, and following the regional strategy, a series of interventions were proposed within the polycentric urban region and explored at the small scale.

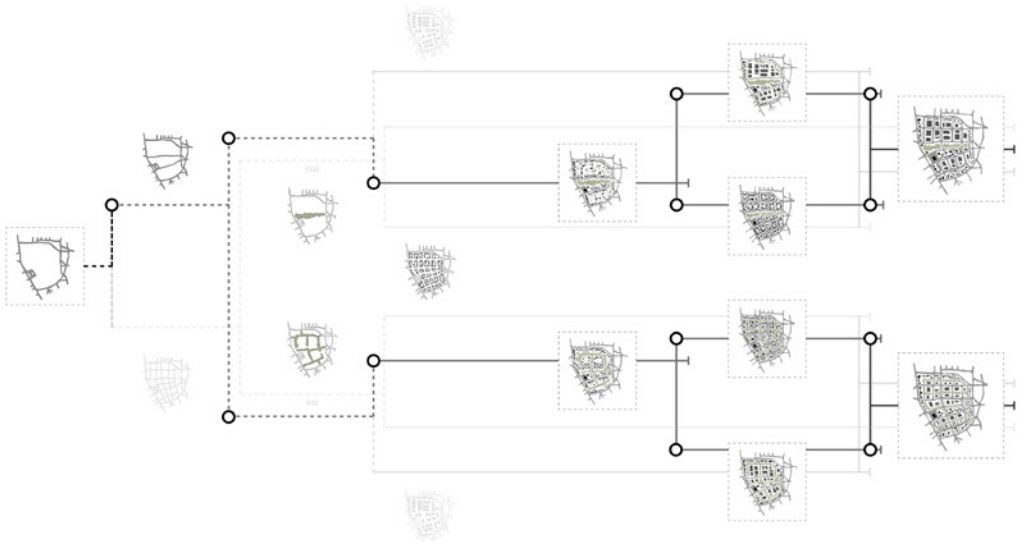

FIG. 1.15 To understand the adaptive capacity of different design proposals, the Adaptation Pathways method developed by Haasnoot, Kwakkel, Walker & Maat was used in this research (2013).

One of those interventions was explored in detail, to understand how design facilitates the creation of a flexible spatial framework that can deal with uncertainty. The exploration took from the method developed by Maxwan Architects and Urbanists for the 'Logica' project in Hoogvliet (Maxwan, 2002), and offered eight multiple alternatives that were then evaluated. The goal of the assessment was to understand which of those alternatives offered a greater adaptive capacity to cope with the future; and to do this, an adaptation pathways map was developed taking from the method elaborated by Haasnoot, Kwakkel, Walker & Maat (2013).

How to manage change in such a difficult and uncertain place needed to be explored, since the implementation environment of the region is very unhealthy. In chapter nine, which deals with the application of the regional strategy, the constraints and difficulties to trigger the transformation process were analyzed. It was also important to understand what the role of the state in this process should be, and some observations were made regarding this issue. Then, all the literature used by this point was revised to identify the key projects of the strategy. One of those projects was analyzed in depth, to understand how it could be taken forward considering the current imbalances of power and interest among the different stakeholders involved. As a result, some comments were made about the usefulness of local coalitions in these difficult contexts. Finally, the impact of the demonstration project was assessed by benchmarking the interventions of the strategy with similar projects and estimating how many green jobs it was able to create over time. The method used for this evaluation is described in detail at the end of chapter nine. What is important to mention here is the project had to be evaluated to understand if it was able to answer the research question set at the beginning of this work.

The final chapter of this work presents some lessons learned and offers a few recommendations for future research, hoping that the findings may contribute to the debate on transition design in resource-rich countries of the developing world. Especially in the Amazonian context.

FIG. 1.16 Luisa Girón is 62 years old and a proud *palera*, the name given to women that engage in artisanal gold mining in the Venezuelan Guayana. She says that she began to scratch the mountains around the village of Icabarú from the moment she was born. Photographs taken by Dagne Cobo Bushbeck. Retrieved from http://elestimulo.com

1.4 – **Limitations and Shortcomings**

One of the biggest challenges of this research was the lack of official data to work in this peripheral region of Venezuela, which contrasted the abundance of written material available. Indeed, there are plenty of excellent articles, reports, technical documents and academic publications on the Venezuelan Guayana, produced by respected scholars, professionals and journalists. But the scarcity of official data was overwhelming, and when found its quality was rather poor. Some of the most important data used for this work was generously provided by Provita, an important environmental NGO based in Venezuela, or downloaded from the RAISG website. The rest were retrieved from open data sources. This search for basic working material was extremely time consuming and frustrating, since most of the data that was found lacked the detail that is needed to work at the small scale. Some data retrieved from OpenStreetMap proved to be useful but extremely basic and incomplete. To work at the intermediate and the small scales, most of the built fabric had to be drawn from scratch in QGIS, using satellite imagery on the background.

Lack of data can be complemented with direct experience. But the possibility of performing field research was not viable due to political and social turmoil in Venezuela. Indeed, the evolution of this research went hand in hand with the escalation of the country's political crisis, which is extremely complex and multi-layered. Beyond safety issues, basic conditions to perform a relevant fieldwork did not exist. During the course of this research, several major blackouts left the entire country without electricity, gas shortages are limiting the capacity of people to move, and domestic flight connections are extremely restricted. The combination of lack of data and lack of fieldwork created serious limitations for the exploration of the small scale. Direct experience is necessary to understand how people live in these peripheral and remote areas; but also to grasp the affordances offered by the built environment, which may be used to support the generation of new alternatives.

1.5 – **Relevance**

This is a crucial topic for the future of Venezuela, since its economy has solely relied on the extraction of non-renewable natural resources since the beginning of the twentieth century. This trend has created a wide range of political, social and economic externalities that are hindering the possibility of a sustainable future for the country. The findings and strategies that will result from this research will hopefully contribute to the debate on how resource-rich countries of the developing world may improve the living conditions of their people by transitioning towards a more sustainable path. In addition, this research explores which may be the role of urbanism in the restructuring of peripheral and remote areas of the Amazon context. It is important to understand if development and preservation are necessarily in conflict, or if new notions of development and preservation may contribute to the reduction of deforestation rates and in the alleviation of poverty. The creation of the conditions that will facilitate the development of local initiatives from the bottom-up, which will hopefully give more opportunities to neglected communities that currently depend on resource extraction, have a clear spatial dimension that needs to be explored. This research seeks to take on that challenge, and to understand how space can contribute to local sustainable development in the Amazon.

2 – The Extractive Havoc

Externalities of resource extraction in Venezuela

FIG. 2.1 The impacts of resource extraction in the tropical moist forests of the Venezuelan Guayana are almost irreversible, at least in the short and medium term. They also have devastating effects further downstream and on a planetary scale. Photograph taken by Javier Mesa. Source: Explora Magazine, 2018.

On February 2016, the government of Nicolás Maduro allowed with an official decree the opening of 110 thousand square kilometers of tropical moist forests for resource extraction, in what is known as the largest mining project in Venezuelan history (Gallardo, 2018). The area, branded as the 'Orinoco Mining Arc', represents a way to get hold of immense revenues from mining concessions after the fall of crude oil prices in 2014, subsequently allowing the authoritarian regime to remain in power. But this will be done at the expense of the destruction of an inmense portion of a very territory with a huge environmental and scientific value. The environmental consequences of this decision have been loudly questioned by many experts, but the regime went forward with the project nevertheless. It is crucial to understand the multiple range of externalities that will derive from this mining project, but also the full extent of the impacts created by the rise of illegal gold mining in this region. In the following pages, the results of an investigation on the environmental, social and economic byproducts of resource extraction in the Venezuelan Guayana will be presented. But before, and only to frame this very site specific problem within a bigger picture, the rationale behind resource extraction in the context of planetry urbanization will be briefly explained.

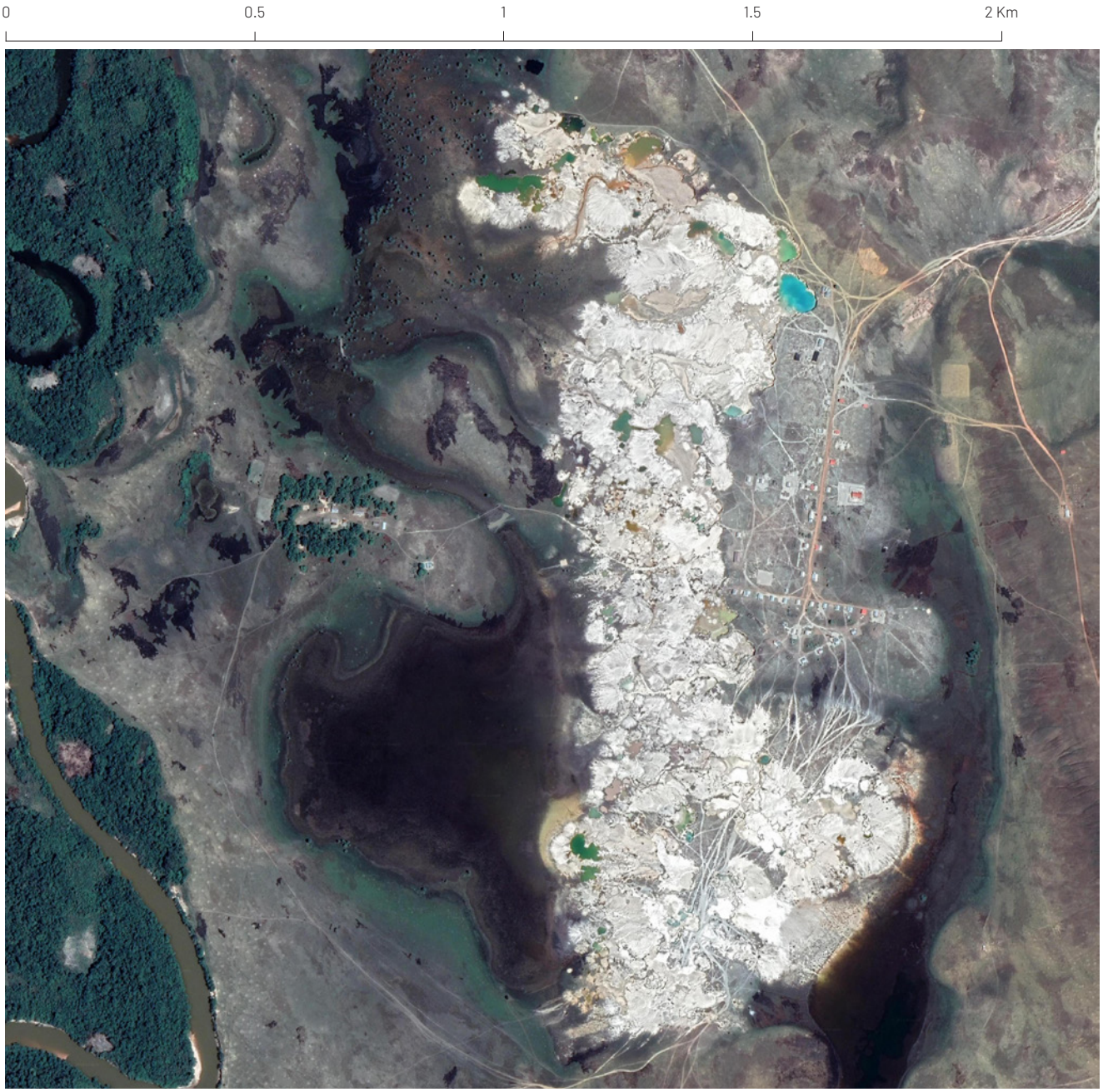

FIG. 2.2 The number of illegal small-scale gold mines has increased exponentially in the Venezuelan Guayana in recent years. This mine, operated by the indigenous community of Campo Alegre, has polluted and degraded more than 81 hectares of savannas inside the Canaima National Park. It is part of what some scholars call as the Indigenous Mining Arc (Lozada, 2017). Source: Google Satellite via QGIS.

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The extraction of natural resources is determined by the demand of the market. In a globalized world, the gold rings that are being sold in Antwerp, or the steel bars needed for the construction of new towers in China, are creating great pressures on resource-rich countries.

Photographs taken by the author (1, 3); Bram Ebus (2); unknown author - Getty Images (4). Retrieved from https://arcominero.infoamazonia.org (2); https://clarknow.clarku.edu

2.1 – **The Rationale Behind Extraction**

The extraction of natural resources is determined by the demand of the global market. Indeed, the patterns of consumption of the Western world -but also the demand of fast-growing countries like India or China- are in constant need of enormous amounts of minerals and raw materials. This evidences that there is a global component to the local externalities that deteriorate the living conditions of millions in the developing world, hindering their possibility for a sustainable future. The so-called 'resource curse' may play an important role in the quality of democratic institutions and in the degree of livability of many resource-rich countries, but to limit the problem statement to this economic theory would be a mistake. The rationale behind resource extraction goes far beyond these local differences, pointing towards the direction of planetary urbanization (Brenner, 2014). As the law of supply and demand puts forward, if the demand for certain commodities grows their prices will inevitably rise in the global market -along with the stocks and profits of the companies that trade them. The forces put in motion by the invisible hand are acting at the global level and are very difficult to apprehend, putting great pressures on very specifiфc places of the world where these resources are to be extracted.

The pressure created on resource-rich countries is so big, that the temptation to engage with extraction becomes almost irresistible. The abundance of natural resources in certain parts of the developing world tends to make those economies completely dependent on them, initiating what economists call the 'resource curse' previosly explained. To facilitate the extraction of those resources, almost all countries make use of statutory laws that separate surface rights from subsurface rights. Most of the times, these pieces of legislation have been inherited from colonial times and consciously perpetuated, commodifying land and water and creating conflicts of common ownership, land dispossession and environmental degradation with long-lasting effects.

As Sasia Sassen point out in *Expulsions* (2014), the vast stretches of dead land and water that are left behind as one of the many byproducts of resource extraction, are nothing more than the surface expression of a global trend. She stresses this planetary dimension of the problem, affirming that the consequences are always the same with disregard of the variety of local situations, with their differences in geopolitical systems and regulations. Indeed, after invoking a long list of cases across the world, in countries that differ greatly among them in terms of political and economic organization, she comes to the conclusion that we 'often overemphasize these familiar differentiations when it comes to biosphere destruction, blaming the specifics for problems that are generic' (Sassen, 2014, p. 150).

There is a way out of this conundrum, at least at the level of the nation. As Mel Watkins puts forward in an essay entitled *Unsettling the Mining Frontier*, 'a country that has the resources can say "No" to mining' (Watkins, 2018, p.48). The path towards that scenario is difficult and contested, even though there are plenty of examples across the globe that have taken serious resolutions to overcoming their dependence on resource extraction. But before we analyze those relevant case studies, it is fundamental to understand the externalities of these global pressures on space.

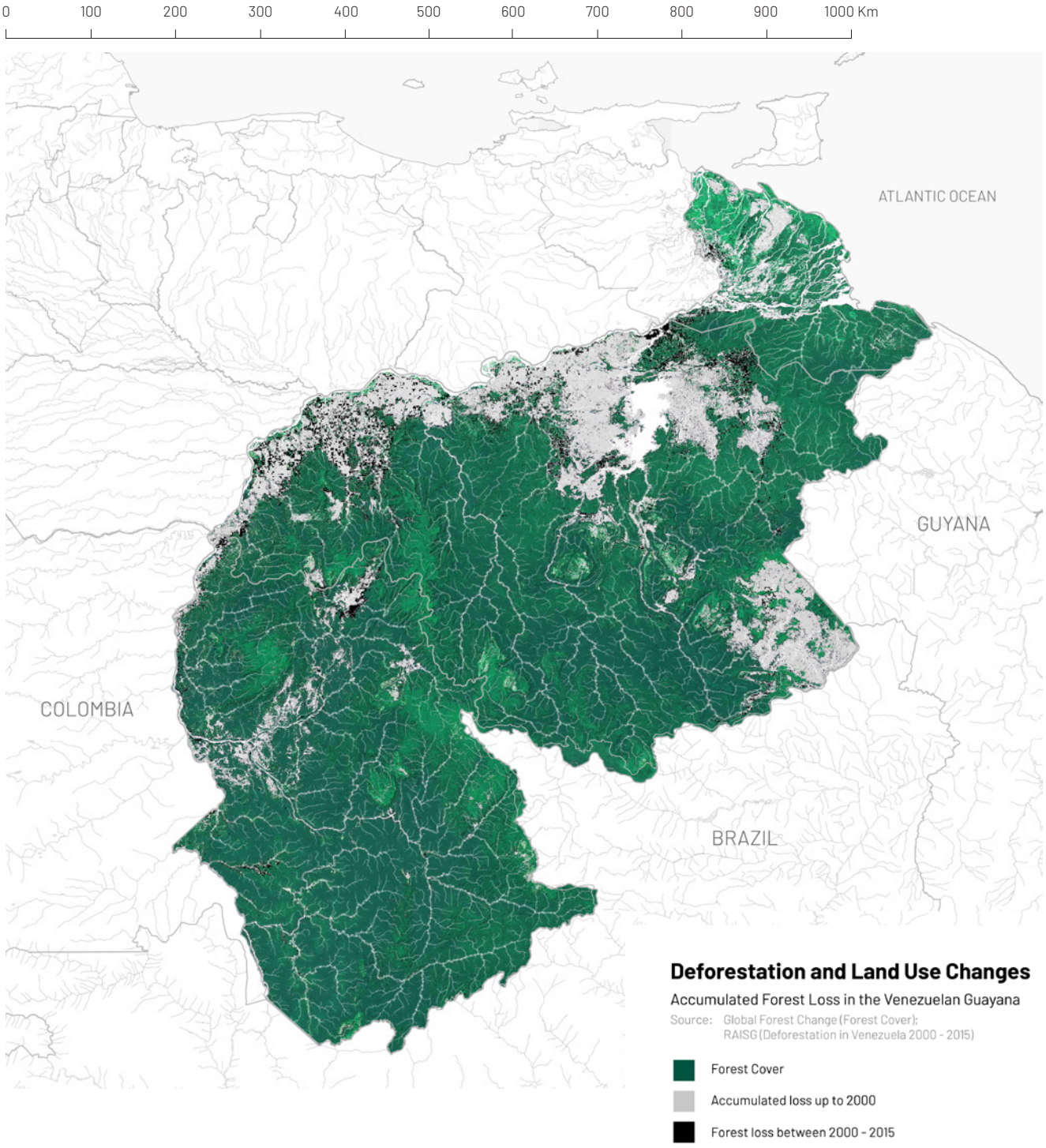


FIG. 2.3 Approximate visualization of deforested areas in the Venezuelan Guayana, since 1920. According to Lozada & Carrero (2017), the magnitude of forest loss accounts for 6,300,000 hectares, of which only 200,000 can be directly attributed to mining activities. Still today, the major causes of deforestation south of the Orinoco River are anarchich small-scale agriculture and livestock farming (Lozada & Carrero, 2017). But in recent years, the rise of illegal small-scale gold mining activities has become an important threat to the environment, especially in the Cuyuní River basin. Source: made by the author with data from RAISG.

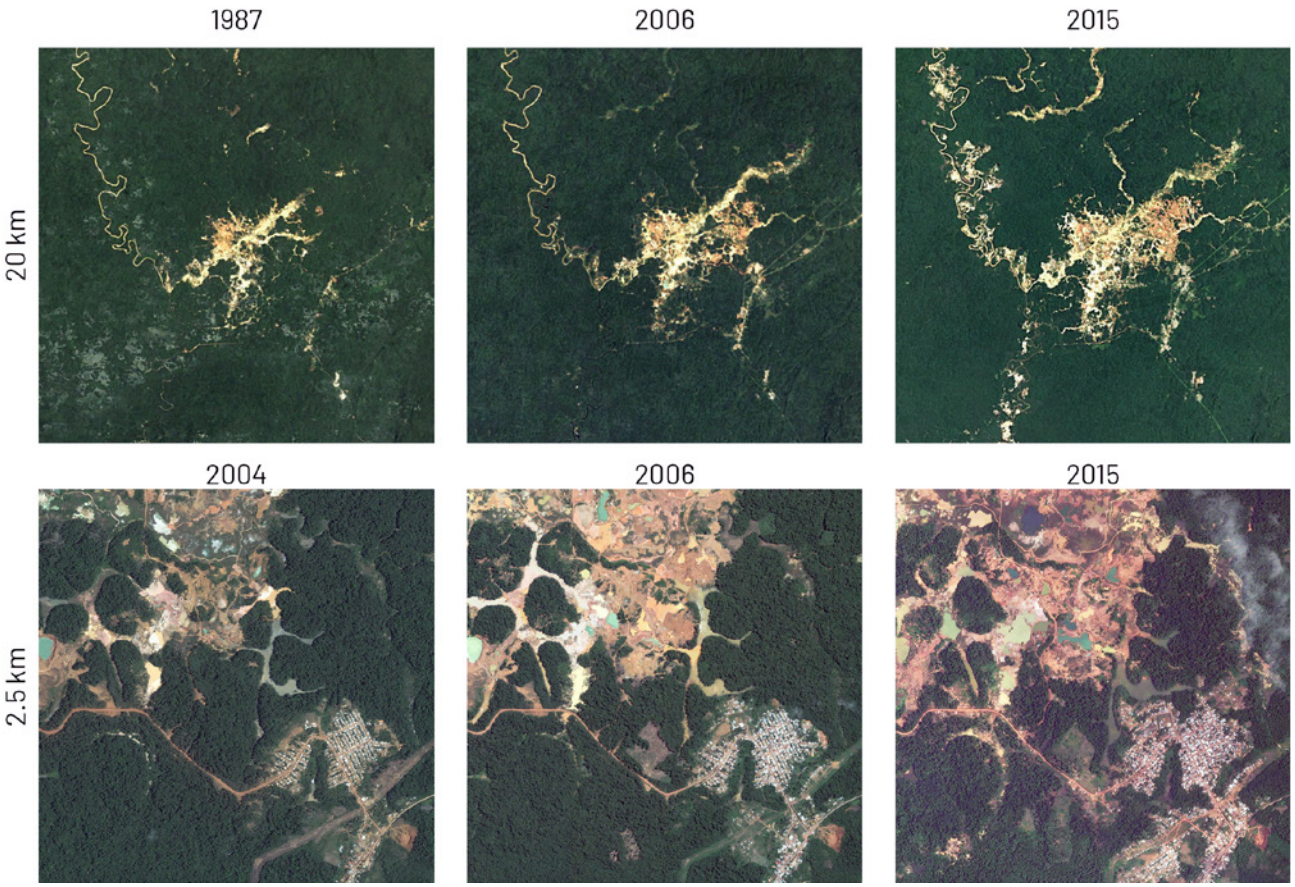


FIG. 2.4 A comparison over time, using imagery from Google Earth, that illustrates the spatial impact of illegal small-scale gold mining around the village of Las Claritas, inside the Imataca Forest Reserve and in the Cuyuní River basin. Source: made by the author, with imagery from Google Earth.

2.2 – **Land Use Changes and the Loss of Biodiversity**

Most of the surface of rainforest that has been lost in the Venezuelan Guayana can be associated to anarchic forms of agriculture and livestock farming that make use of slash and burn techniques, to take advantage of the nutrients stored in the burnt vegetation in a region with very poor soils (RAISG, 2015; Lozada & Carrero, 2017). And at least up to 2000, an important percentage of the forest cover was also lost to the activity of the *Corporación Venezolana de Guayana* –a state-owned corporation better known as the CVG–, and to the many infrastructures it built over four decades to support the national steel and aluminum industries. Since its creation in 1960, the CVG changed the land use of vast extensions of forest in a planned and controlled way, making cost-benefit analyses and linking these transformations to the development of the national economy. The extraction of iron ore and bauxite, the planning of Ciudad Guayana, the impressive system of hydroelectric dams and reservoirs built along the Caroní River, and the construction of railways, roads, and docks for the processing industries, have contributed to the loss of biodiversity in the northern parts of the region (RAISG, 2015). Although deforestation is never desirable in such a fragile context like the Amazon, the CVG managed to create linkages both upstream and downstream over the course of its existence, going beyond extraction, adding value with finished and semi-finished products, and fostering the development of a service economy around the national processing industries (Prat, 2012; Watkins, 2018).

FIG. 2.5 Drivers and trends associated to the rise of illegal gold mining. At the global scale, the rise of gold prices has been a crucial factor. At the national scale, the highest inflation rates in the world have influenced in the loss of value of the local currency. And finally, the rise of confirmed cases of malaria in the region is one of the most important trends at the local scale. Source: made by the author, with data from FRED, IMF and WHO.

Traditionally, illegal mining had only played a minor role in deforestation patterns (RAISG, 2015). But in recent years, and in close connection to the meteoric rise of gold prices in the London bullion market, there has been an escalating of illegal mining operations throughout the region. Although this Gold Rush is a widespread phenomenon all over the Amazonia, with hundreds of illegal mining points sprouting in Brazil, Ecuador, Perú and Bolivia, it has gotten out of control in the Venezuela Guayana (RAISG, 2018). This trend can be linked to the collapse of the national economy and to the devaluation of the local currency: to have some gold is as good as having American dollars, and this has become a very powerful driver for many.

In the Venezuelan Guayana, iron ore and bauxite can only be found in mineral veins that are very site-specific. The certainty of having large deposits in a certain location has made their extraction a profitable business for the CVG, allowing the construction of the necessary infrastructures and fostering the creation of several processing industries. Although this type of industrial extraction has deforested and fragmented habitats of rich biodiversity, it is site-specific and non-expansive in its nature. But gold mining is a different story. Some areas can have higher concentrations of gold, and veins may also be found below the surface in quantities that will allow for the creation of a permanent industrial platform, like in the mining town of El Callao. But rocks and minerals have been weathered down over millions of years in this region, scattering small particles of gold dust on the riverbeds of the Orinoco and Cuyuní basins. For this reason, gold prospecting is widely performed by groups of small-scale gold miners in a nomadic fashion, cutting-down large surfaces of rainforest near alluvial gold placers. Once the resources have been depleted in one place, miners simply move their camp to repeat this process somewhere else, leaving destruction and pollution behind.

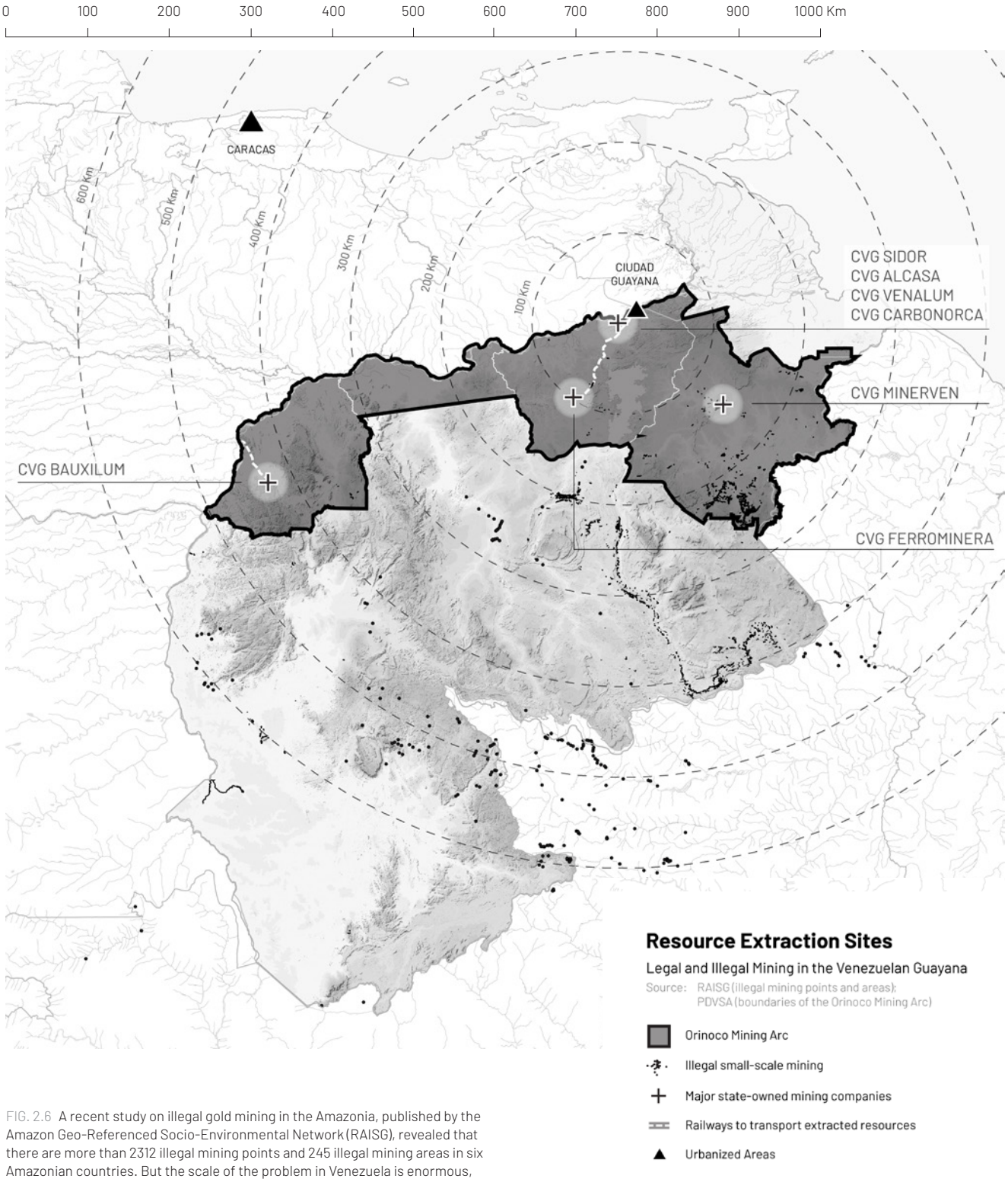


FIG. 2.6 A recent study on illegal gold mining in the Amazonia, published by the Amazon Geo-Referenced Socio-Environmental Network (RAISG), revealed that there are more than 2312 illegal mining points and 245 illegal mining areas in six Amazonian countries. But the scale of the problem in Venezuela is enormous, since 1899 of those points can be found in the Venezuelan Guayana -more than 80% of the total number in the entire Amazon basin. In addition, the national government has created the 'Orinoco Mining Arc', a vast area of concession blocks for industrial extraction that covers 110 thousand square kilometers in the northern part of the region. Source: made by the author.

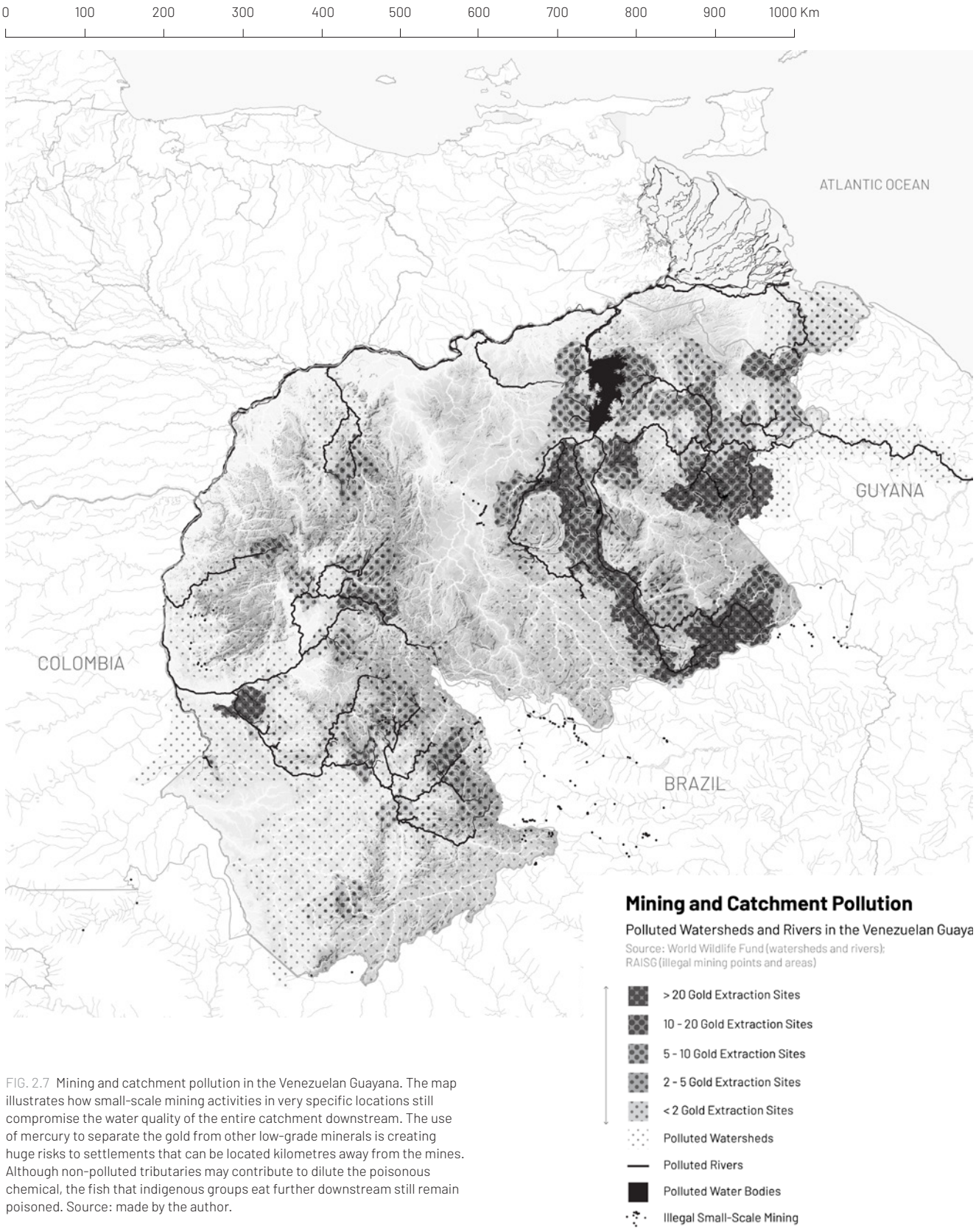


FIG. 2.7 Mining and catchment pollution in the Venezuelan Guayana. The map illustrates how small-scale mining activities in very specific locations still compromise the water quality of the entire catchment downstream. The use of mercury to separate the gold from other low-grade minerals is creating huge risks to settlements that can be located kilometres away from the mines. Although non-polluted tributaries may contribute to dilute the poisonous chemical, the fish that indigenous groups eat further downstream still remain poisoned. Source: made by the author.

FIG. 2.8 Artisanal constructions to sluice for gold can be found in the illegal small-scale mines of the region. Photograph taken by Marek Audy. Source: Explora Magazine, 2018.

FIG. 2.9 Small-scale miners searching for gold with hydraulic monitors in the State of Bolívar. Photograph taken by Marek Audy. Source: Explora Magazine, 2018.

FIG. 2.10 Tailing ponds polluted with mercury can be found throughout the illegal small-scale gold mining areas of the Venezuelan Guayana. Photograph taken by Alberto Blanco. Source: Explora Magazine, 2018.

2.3 – **Tailing Ponds, Water Pollution, and the Outbreak of Malaria**

But deforestation is only the first part of the process. To separate gold from other low-grade minerals, small-scale gold miners need to crush the ore and sift it with mercury; and once the extraction site is abandoned, tailing ponds are left behind as a byproduct. The poisonous chemicals are usually mixed with the waters of these tailings, posing huge environmental risks in the area but also further downstream, since the polluted waters infiltrate the ground and sometimes spill the pollutants when heavy rain occurs. The dispersed nature of illegal gold mining makes these local actions a regional and international problem, because they affect an important part of the Essequibo River Basin that flows into Guyana, a part of the Amazon River Basin that flows into Brazil, and the coastal ecosystems of the eastern Caribbean islands. The pollution of entire watersheds with mercury is already having devastating effects for the indigenous peoples that have always depended on fishing for their subsistence, poisoning and killing many throughout the region and forcing entire communities to change their diets (Red ARA, 2013).

In addition, illegal mining has paved the road to an outbreak of malaria in Venezuela. The number of cases reported by the World Health Organization has increased by 375% between 2000 and 2015, a situation that has particularly worsened in the past five years (Grillet et al. 2018). An interesting time frame if we consider that it overlaps with the highest prices on gold in the history of commodities exchange. It is not a coincidence that more than 80% of the malaria cases in Venezuela are concentrated in the Guayana Region, especially in the municipalities where illegal extraction has thrived. Deforested areas have higher temperatures than the average rainforest, warming the polluted waters of the tailing ponds and creating a fertile environment for mosquitoes to deposit their eggs. Since gold miners are nomadic people because of the nature of their work, they spread the disease throughout the towns and cities of the region after having being bitten at the mine.

‘I already had malaria for about 50 times. It was like I was urinating Coca-Cola.’

[Carlos Rodríguez • El Callao, Bolívar]

Stories of Dependence

Carlos knowns the symptoms of malaria very well, and he is sure that he has been infected with the disease once again. His body is shaking in front of a shack in the middle of the jungle, and he can barey speak. The medicines needed to treat malaria are very hard to find in Venezuela, so most miners suffer from continuous relapses and are unable to combat the parasite. Infected mosquitoes are everywhere in the mines, and workers cannot avoid being bitten. Indeed, the combination of high temperatures in deforested areas and tailing ponds facilitate the creation of breeding niches. But Carlos still believes that the financial rewards that gold mining brings are worth taking the risk. But back home, his wife and children have also been infected with malaria more than once.

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes.

Ebus, B. (2018, January 15). *Digging into the Mining Arc. The destruction of 110 thousand square kilometres of forests in the largest mining project in Venezuela.* Retrieved from https://arcominero.infoamazonia.org

Pardo, D. (2014, August 24). *The malaria mines of Venezuela*. Retrieved from https://www.bbc.com

FIG. 2.11 This gold miner says he has had malaria 60 times in nine years. Photograph taken by Meridith Kohut. Retrieved from https://www.nytimes.com

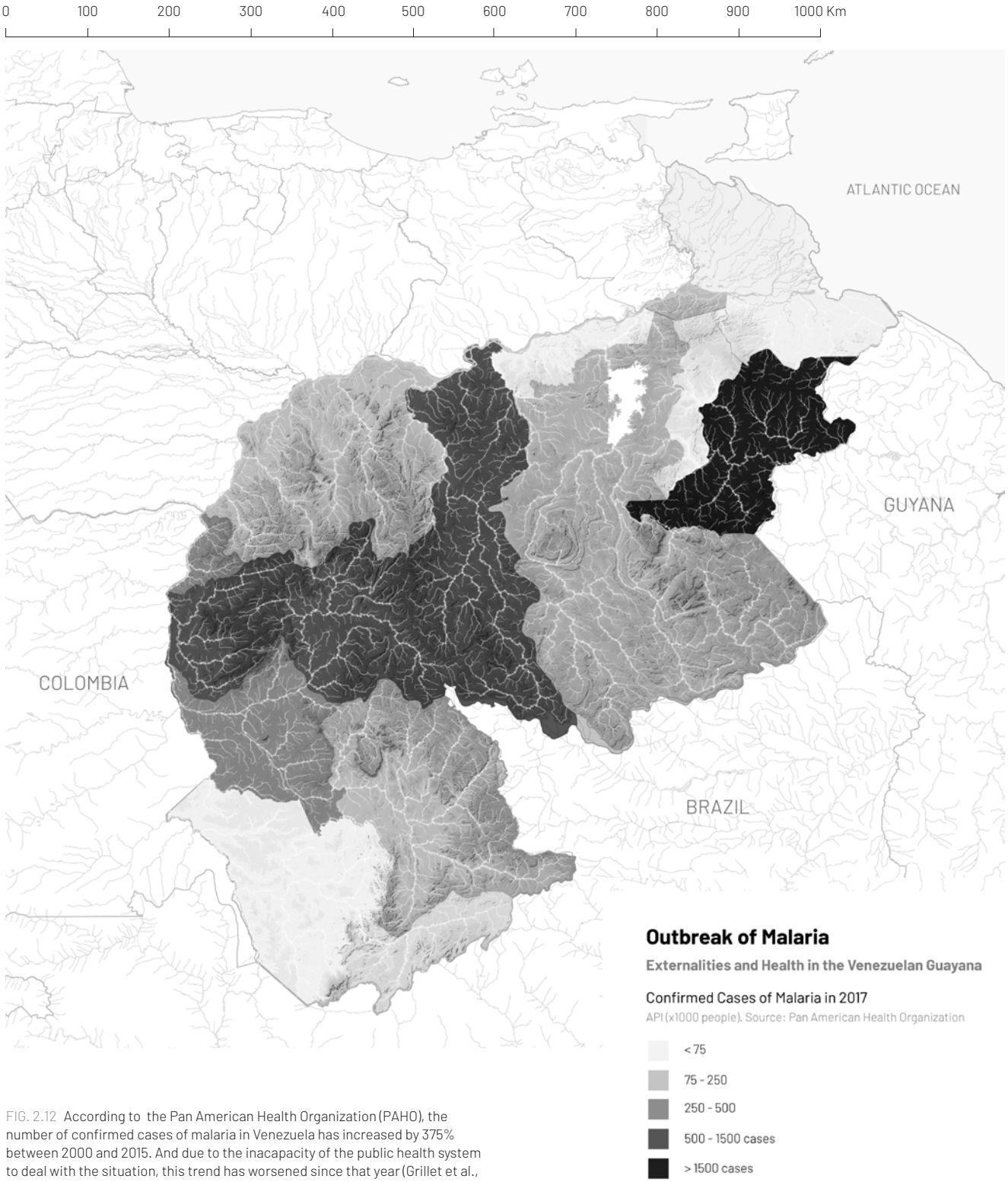


FIG. 2.12 According to the Pan American Health Organization (PAHO), the number of confirmed cases of malaria in Venezuela has increased by 375% between 2000 and 2015. And due to the inacapacity of the public health system to deal with the situation, this trend has worsened since that year (Grillet et al., 2018). An interesting time frame if we consider that it overlaps with the highest prices on gold in the history of commodities exchange. More than 80% of the malaria cases in Venezuela are concentrated in the Guayana Region, especially in the municipalities where illegal extraction has thrived. Source: made by the author, with data from the Pan American Health Organization.

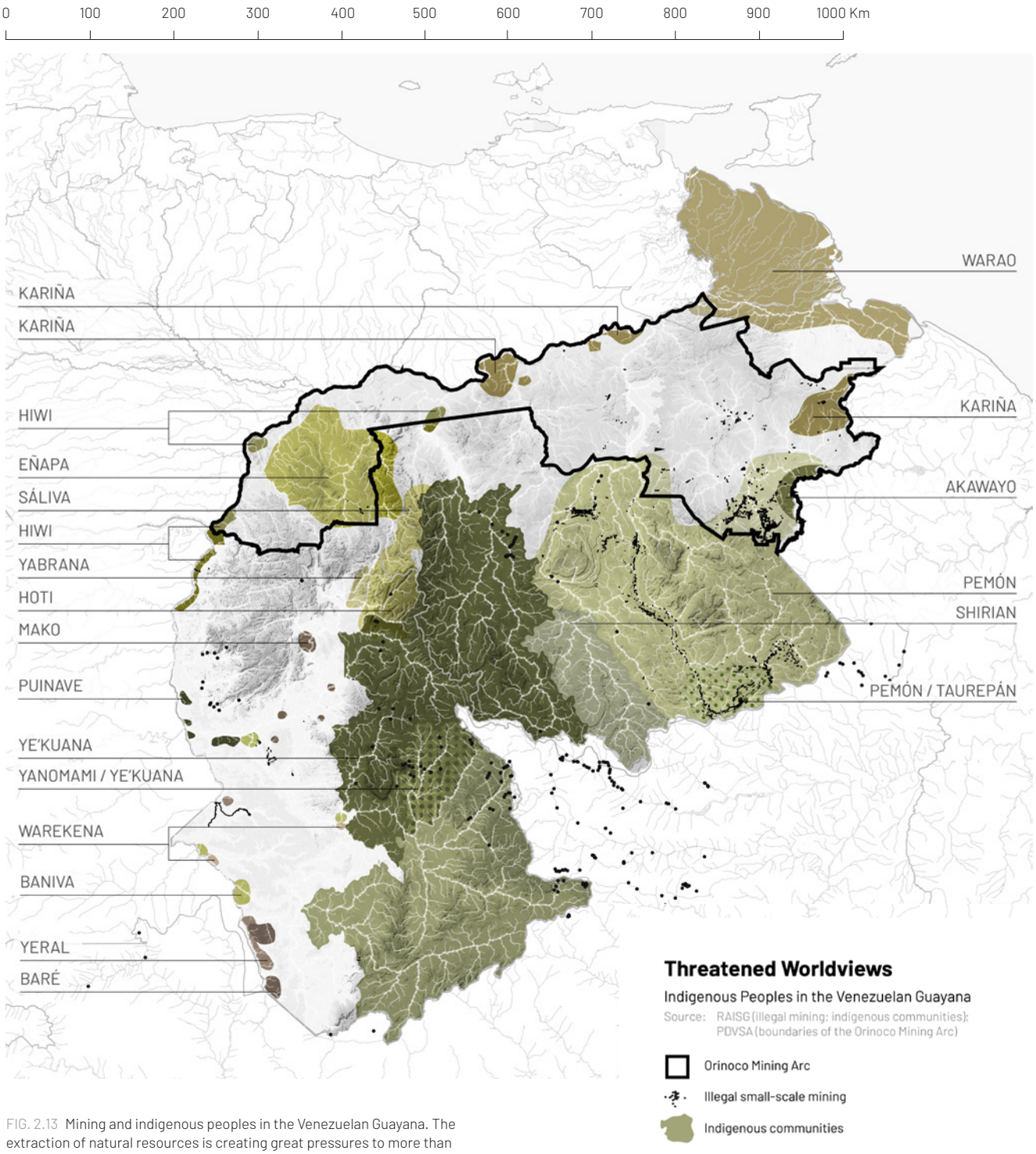


FIG. 2.13 Mining and indigenous peoples in the Venezuelan Guayana. The extraction of natural resources is creating great pressures to more than 23 indigenous groups that inhabit this region long before the arrival of Europeans,and that add-up to more than 200.000 inhabitants. To the north, the creation of the Orinoco Mining Arc threatens the way of living of the Kariña, Hiwi, Eñapa, and Akawayo groups, but also a small part of the territories that the Pemón and the Warao occupy. The rest of the indigenous peoples of the region are threatened by illegal small-scale gold mining instead. And in some cases, mines are controlled and operated by indigenous groups, willingly and without coercion. Source: made by the author with data from RAISG.

FIG. 2.14 The Yanomami peoples are only of the 23 indigenous groups that live in this vast region. Photograph taken by Bernd Kroening (Source: Explora Magazine, 1).

FIG. 2.15 Small-scale gold mining in the Cuyuní River basin, making use of hydraulic monitors. Photograph taken by Marek Audy (Source: Explora Magazine, 1).

FIG. 2.16 Aerial view of a *shabono*, the traditional hut used by the Yanomami peoples. Photograph taken by Jurgen Escher (Retrieved from: http://weitblick.bistum-eichstaett.de/der-siebte-tag-eine-reise-in-die-bedrohte-welt-der-yanomami/adv_20712-adveniat-amazonas/).

2.4 – **Violence, Land Dispossession, and Neo-Slavery**

The indigenous peoples of Venezuela have become a minority of little more than 700.000 inhabitants –around 3% of the total population. Although only a quarter of those first peoples live in the Venezuelan Guayana, it remains the most culturally diverse region in the country because of the existence of 23 different indigenous groups spread throughout the territory (Mansutti Rodríguez, 2016). They have been living here long before the arrival of Europeans, but the global demand of resources and the subsequent rise of mineral commodity prices are threatening their ways of living, simply because of the existence of resources beneath the land they occupy. This only adds to the long list of cause-effect relations of deterritorialization that are taking place at a planetary scale, in the context of cultural and economic globalization. But in truth, this is only one part of the problem.

In 1829 Simón Bolívar promulgated the Quito Decree, where he safeguarded the state ownership over mining within the territory of the newly founded nation of Gran Colombia –of which Venezuela was a part of by that time (Arráiz Lucca, 2016; Martz, 1987). This principle stated, very clearly, that all mines and natural resources belonged to the Republic. The decree consolidated the same colonial principles of the previous mining legislation issued by the Spanish crown in 1783 –the *Ordenanzas de Minas de Nueva España*–, which declared that all mines were property of the royalty, regardless of the ownership rights. Therefore, Bolívar's decree gave continuity to a colonial piece of legislation that separated surface rights from subsurface rights. And even though the mining legislation has been modified several times throughout Venezuela history, this fundamental principle has remained untouched. As Pierre Bélanger puts forward, even though this fracture can be understood just as a legal instrument, "the territorial repercussions of this simplified divide edify the disembodiment of the ground from what is below ground, and enmeshes the bureaucratic partitioning of water from land" (Bélanger, 2018).

‘In several communities we’ve found Yanomami with numbers written on their shoulders. They keep them like slaves. There’s no authority here to protect us’

[Luis Shatiwe Ahiwei, Yanomami leader • State of Amazonas]

Stories of Violence

Luis Shatiwe works as the general coordinator of HORONAMI, a Yanomami civil society organization. His statement was reaffirmed by Clíver Alcalá, a retired major general from the army, who says some invading Brazilian miners have enslaved indigenous peoples and branded them with tattooes on their backs to claim them as personal property (Ebus, 2018). Indigenous rights groups and local officials say that illegal miners see the indigenous Yanomami tribe, but also others throughout the region, as cheap labor for their mining operations. (Ore, 2013). Luis and other indigenous leaders are worried, since many communities have been forcefully inserted in the extractive economy (Ebus, 2018), and others have been massacred when resisting invasions.

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes.

Ebus, B. (2018, January 15). *Digging into the Mining Arc. The destruction of 110 thousand square kilometres of forests in the largest mining project in Venezuela.* Retrieved from https://arcominero.infoamazonia.org

Ore, D. (2013, December 3). *Illegal miners infest Venezuela’s Amazon.* Online article, retrieved from https://uk.reuters.com

FIG. 2.17 Luis Shatiwe among other members of the ‘Horonami Yanomami Organization’. Retrieved from https://https://www.facebook.com

‘The “beautiful” girls cannot leave anymore, they keep them there. Girls that want to escape disappear’

[Henelda Rodríguez • Organization for Amazon Indigenous Women Waanalera]

Stories of Violence

Prostitution and human trafficking for the purpose of sexual exploitation is a very profitable “business” in mining areas, and it may even report as many dividends as the possession of gold extraction machines. Women, teenagers and even young girls from diverse ethnic backgrounds are vulnerable to sexual exploitation. Indeed, access to a minor costs more than having sexual intercourse with a woman of legal age, and therefore child-trafficking becomes more lucrative to those who engage in this dreadful criminal business. Indigenous women are the most vulnerable of all, especially those that live close to a mine. Kidnapping or luring them with deceptive offers does not involve large sums of money for the human-trafficker (Moncada Acosta, 2017).

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes.

Ebus, B. (2018, January 15). *Digging into the Mining Arc. Online report*, retrieved from https://arcominero.infoamazonia.org

Moncada Acosta, A. (2017). ‘Oro, sexo y poder: violencia contra las mujeres indígenas en los contextos mineros de la frontera amazónica Colombo-Venezolana’. Textos e Debates, 1(31), 43-53.

FIG. 2.18 Two indigenous girls washing their clothes in a river. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

This divide has contributed to an escalation of conflict in the region, in which illegal gold mining and other 'less illegal' forms of extraction supported by the central government –such as the Orinoco Mining Arc– are putting great pressures on the sites where indigenous peoples have organized their lives for centuries. The rise of gold prices has become a powerful driver for illegal miners, usually armed and ready to use the most primitive forms of violence to control resource-rich areas, even if they are occupied by indigenous groups. And the central government, legally sheltered by the principle described above, also believes that it has the lawful right to displace entire communities with the aid of the National Guard to prepare the ground for more organized forms of extraction. In any case, when analyzing the effects of the violence that is exerted over these under-represented communities, it does not matter if mining activities are legal or illegal because the consequences are the same. Forced relocations, transculturation of groups with different worldviews, new forms of slavery and exploitation, and the instauration of vicious cycles of dependence, are some of the social byproducts brought by the extractive economy.

Traditionally, the indigenous peoples that live in the Venezuelan Guayana have viewed gold from a religious perspective, never as a commodity to be sold or exchanged within the logic of the market. It was either an offer to the gods or a punishment, a golden curse (Vitti, 2018). The groups that offered it to their gods used to extract small quantities from the riverbeds, separating the precious metal from the other sediments with extreme care and without the aid of chemical compounds. But in recent years many indigenous communities of the State of Bolívar have started to make use of hydraulic monitors and mercury to extract gold in larger quantities, willingly and without coercion (Lozada, 2017). There are illegal small-scale gold mines controlled by Ye'kuana and Sanema indigenous communities in the Caura River basin; or by Pemón groups in Urimán, Kamarata, and Canaima, among many other mines inside the Canaima National Park. These indigenous mines could be regarded as one of the most unfortunate cases of transculturation that has taken place in recent times. It has mostly taken place over the last ten years, and constitutes what some scholars call the 'Indigenous Mining Arc' (Lozada, 2017).

But the situation is different in the State of Amazonas. There, many self-sustaining communities continue to depended on the ecosystem services provided by the natural system to preserve their way of life, like the Yanomami. Illegal gold mining destroys this possibility once it arrives at a certain location, leaving the indigenous peoples that used to depend on the forest with only two options: either they abandon the village and search for a new place to live, or they stay and depend on this new economy –one that will impose on them a new relation towards nature. The communities that are forced to relocate will never have the certainty that this aggression won't take place again in the future. And in any case, if they decide to settle further downstream within the same catchment, the water and the fish they will consume will be polluted with mercury . The communities that decide –or are forced– to remain are subject to more direct forms of violence. The destruction of the environment that used to support their needs, and the imposition of a logic that sees nature as an object, pushes them to sell their workforce in a market-driven economy. Renewed forms of slavery are born in this context, since local communities are forced to work for the armed miners in the way they consider more suitable: men are usually used as 'pack mules' (Vitti, 2016), and women are pushed to grow food, cook meals, or forced into prostitution (Moncada Acosta, 2017).

FIG. 2.19 The Warao people live in the Orinoco Delta, and their way of life has a close connection to water. The pollution created by the extractive economy further upstream has a direct impact on their health, even if they are kilometers away from the mining site. Photograph taken by the author.

As Macarena Gómez-Barris has stated, the extractive economy is reducing, constraining and converting the lives of these indigenous groups to a commodity (Gómez-Barris, 2017), instigating the extinction of their cultures. But this can happen in multiple ways, and the case of the 'Indigenous Mining Arc' mentioned above, which has no relation with the 'Orinoco Mining Arc' created by the national government, is a perfectly good example of this. The destructive power of extraction can eradicate ancestral worldviews in direct ways, when armed miners kill or enslave entire indigenous communities -the massacre of more than 80 Yanomami people in the settlement of Irotaheri is an unfortunate case that illustrates this point (James, 2012; Survival, 2012). But it can also seduce them and make them dependent on this form of economy simply because of the lack of opportunities they have in remote areas of the region to support some new needs they might have after centuries of transculturation (Lozada, 2017).

‘If I do not work in the mines, I do not have a way to maintain my family’

[Edgar, migrant worker • El Callao, Bolívar]

Stories of Dependece

Edgar used to work as a carpenter in the city of Maturín. But a few yers ago he left the woodworking workshop and decided to migrate to the gold mines of the south of the country. He couldn’t make enough money to pay his assisstant, the rent, replace the cost of the materials he needed to buy, and support his family. The economic crisis and the extreme inflation rates in Venezuela left him no other choice but to become a miner. ‘It is a bit tough, but at least I can make enough money to feed my family now’, he says. There are many others like him in the region, not only migrant workers but also professionals who decided to close their businesses because of the lack of opportunities throughout the country. Now they have found in mining a way of subsistence (Marra, 2016).

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes.

Ebus, B. (2018, January 15). *Digging into the Mining Arc. The destruction of 110 thousand square kilometres of forests in the largest mining project in Venezuela.* Retrieved from https://arcominero.infoamazonia.org

Marra, Y. (2016, May 3). *La minería se convirtió en un atractivo hasta para los profesionales.* Online article, retrieved from http://cronica.uno

FIG. 2.20 A gold miner about to enter a vertical shaft in El Callao. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

FIG. 2.21 Formal businesses are closing, but informal services related to the prospecting of gold are booming instead. Only in the mining town of El Callao, there are more than 500 illegal gold buying houses. Retrieved from https://www.telesurtv.net

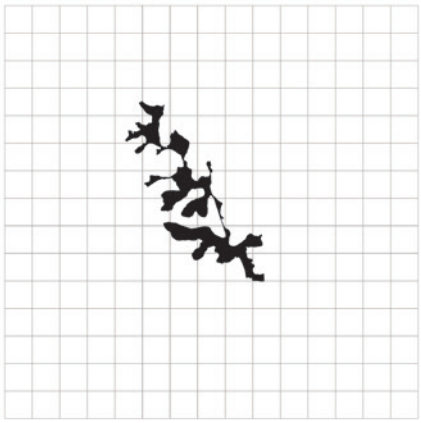
FIG. 2.22 A man in an informal processing mill, heating the compacted gold-mercury amalgam to dissolve the poisonous quicksilver and finally obtain a few grams of gold. Photograph taken by Clavel A. Rangel. Retrieved from https://www.flickr.com

FIG. 2.23 Even though gold is widely used as a parallel currency in the Venezuelan Guayana, miners still cash some of the gold they extract in informal gold buying houses to buy certain goods and pay for specific services. Photograph taken by Fabiola Ferrero. Retrieved from http://elestimulo.com

2.5 – **Transformation of Local Economies**

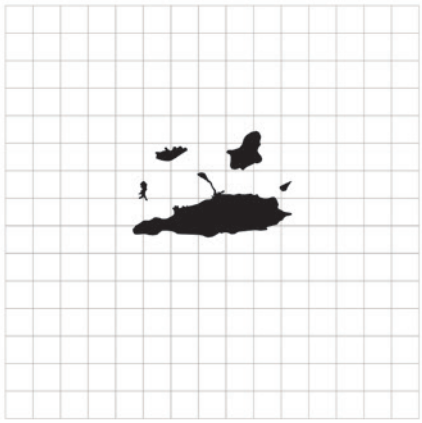
The consequences of the rise of illegal gold mining can also be seen outside the tropical forest. In a country with a contracted economy and the highest inflation in the world (the IMF forecasts an inflation rate of 10.000.000% for 2019)(IMF, 2018), a gram of gold provides an excellent way to survive the economic crisis. In any case, it will always be more profitable than having Bolívares –the devaluated local currency. There is a parallel economy in some parts of the Guayana Region, where gold is used as a currency to make the most trivial transactions of everyday life. In remote settlements like El Paují or Santa Elena de Uairén, the monthly cost of internet can be paid with a gram of gold. For the same price you can also buy a bottle of rum, but in a mine it can cost three times more. These are merely some examples, since there are many other services and goods that can also be paid with this mineral.

The combination of the economic crisis and the rise of illegal gold mining has also led to the destruction of the formal economy. Small-scale mining has always been the main source of employment in peripheral towns like Tumeremo, El Dorado or Las Claritas, among many others. But in recent years a number of settlements that have traditionally relied on other activities are now very dependent on extraction. In an interview made by the author to Rafael Saavedra, councilor of Upata and a member of The Radical Cause –a working-class political party with strong roots in the mining industries of Guayana–, the economy of his hometown has dramatically changed. Upata is a mid-sized city known for its agricultural production, its logging companies, and for livestock raising. But according to Saavedra, many businesses have recently closed to shift towards informal and illegal services related to the prospecting of gold. Signs reading "we buy gold" can be found on the storefronts of former shops, creating a network of informal gold-buying houses where miners go to cash their findings. Most of those who were left unemployed are now forced to work in the open-pits; either as miners, cooks, or simply as informal vendors of goods.



BAUXITE
legal mining / state-owned industries / all region

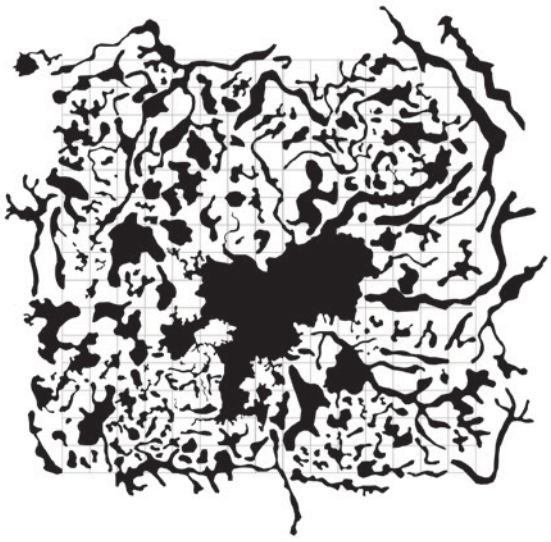
634 ha



IRON
legal mining / state-owned industries / all region

753 ha

MAGNITUDE OF AREAS



GOLD
illegal mining / small-scale miners / only Sifontes Municipality

11.701 ha

FIG. 2.24 Geological conditions determine the type of extraction. In the Venezuelan Guayana, iron ore and bauxite is extracted in mineral veins that are very site-specific. Gold may also be found in veins. Such is the case of the underground galleries that surround the town of El Callao. But rocks and minerals have been weathered down over millions of years in this region, scattering small particles of gold dust on the riverbeds of the Orinoco and Cuyuní basins. For this reason, groups of illegal small-scale miners search for gold in a nomadic fashion, cutting-down large surfaces of rainforest near alluvial gold placers. Once the resources have been depleted, miners move and repeat this process somewhere else. Source: made by the author.

FIG. 2.25 A group of illegal small-scale miners looking for gold with hydraulic monitors at the Cuatro Muertos mine, near the village of Las Claritas. Photograph taken by Meridith Kohut. Retrieved from https://www.nytimes.com

Millions of dollars pass through these gold buying houses every year without taxation; and what is even worse, entire communities are being condemned to a dark future as they become dependent on the extractive economy while other forms of employment disappear. The ability of coming generations to meet their needs is being severely compromised in this resource-rich region in many ways: from an economic standpoint, nothing stays and nothing is created; from an environmental perspective, only destruction is left behind; and from a social point of view, dependence on extraction is perpetuating the poverty cycle. We must shape a different future for Guayana, but to do so it is critical to push away "from a paradigm of mere resistance into the more layered terrain of potential, moving within and beyond the extractive zone" (Gómez-Barris, 2017).

3 – Comparative References

Mining Policies and Strategies in the Americas

FIG. 3.1 Whitewater rafting has become a popular outdoor activity in Costa Rica, a country where mining has been banned and ecotourism thrives. Retrieved from https://costarica.org/

A literature review has been made to identify strategies and mining policies in several Latin American countries that are looking to shift from 'extractivism' towards other forms of economy. Other examples have also been included about countries that are making efforts to reduce and remediate the negative externalities of the mining industry, such as the United States; or where national governments are trying to make a more efficient use of the extractive revenues to improve the living conditions of its people, like in Chile (Watkins, 2018). A brief analysis of the Venezuelan case during the second half of the XX Century has also been included, since it became an important model for other resource-rich countries all over the world, until the arrival of the Bolivarian Revolution of Hugo Chávez. It must be said that all these case studies focus their attention on industrial mining carried out by formal companies. Strategies and policies to control illegal mining still need to be found, if they exist at all.

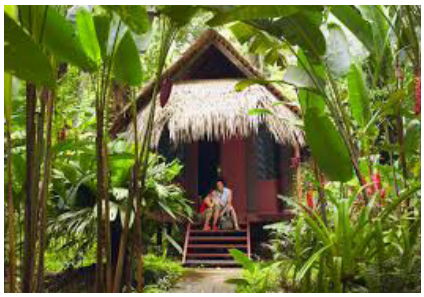


FIG. 3.2 Ecotourism has become one of the leading branches of the national economy in Costa Rica. Retrieved from https://www.roughguides.com

FIG. 3.3 Protesters in San Salvador, El Salvador, demonstrating against mineral extraction. Retrieved from https://www.americamagazine.org

FIG. 3.4 In Panama, mining operations are forbidden in the Ngäbé-Büglé indigenous territories. Retrieved from https://avispa.org

Costa Rica

Since the late 1980s Costa Rica has been implementing policies to preserve its rich biodiversity, focusing on environmental values and developing a strong ecotourism sector that has become one of the leading branches of the national economy (Broad & Fischer-Mackey, 2016). According to Mel Watkins (2018), ecotourism not only guarantees preservation in the long term, it also creates more jobs than the mining sector. That environmental vision was set to create an alternative path to resource-extraction, and it has gained wide support from the public. Pressure from civil society in 2002 pushed the president to initiate a ban on new open-pit mining. In 2010, the Congress passed that ban into a law, but also incorporating a prohibition on the use of cyanide in mining operations. The ban has also been acted by the Supreme Court against mining companies in investor-state disputes. In 1996 Costa Rica created the Payments for Environmental Services Program (PESP), a marketing tool that has had positive impacts on the maintenance of ecosystems and in terms of the benefits they generate for small and medium-size landowners (Obando, Ugalde & Herrera, 2013). In 2008 the Fund for Sustainable Biodiversity (FBS) was also created, another milestone in the development of incentives for conservation.

El Salvador

Opposition from the 'National Roundtable against Metallic Mining', a coalition formed in 2005 by both local and national community groups preoccupied with the adverse health effects of mining, created public awareness nationwide through advocacy and education (Broad & Fischer-Mackey, 2016). This bottom-up initiative created an important pressure on the national government, forcing the Ministry of Environment and Natural Resources to stop issuing new mining permits in 2006. A law has not been passed by the legislative branch, but the moratorium is a de facto mining ban since no new permits have been issued by the government by 2019. A national poll in 2015 showed wide public opposition to mining throughout the country. This has to do with the fact that El Salvador is a small rural country with a large peasant base that is now aware of the negative impacts that watershed pollution could have on the agricultural and tourism economy they depend upon (Watkins, 2018).

Panama

The restrictions on mining in Panama are very different, in the sense that they are limited to the territories on which the Ngäbé-Büglé indigenous peoples live (Broad & Fischer-Mackey, 2016). The pressure on those lands, which represent one tenth of the country's total surface, has triggered violent and deadly protests between the indigenous peoples and the national government, bringing the attention of international agencies such as the Organization of American States and the United Nations. In the end, the Panamanian government was forced to pass two laws prohibiting the extraction of natural resources on those indigenous territories, to the point that even existing mining concessions could be annulled. It is important to mention that these policies can only be implemented if the indigenous territories have previously been recognized as such by the national government. In many resource-rich countries around the world, indigenous territories are usually not recognized, at least, not in a formal way. And in case they are, these territories are reduced in size.

FIG. 3.5 The Páramos are known in Colombia as the large water factories of the Andes. They are the source of most of the freshwater resources of the country. Retrieved from https://es.mongabay.com

FIG. 3.6 The Glacier Protection Act of 2010 is a regulation that works at the national level, but in Argentina the provinces have the last word when it comes to mining projects within their borders. Retrieved from http://center-hre.org

FIG. 3.7 Even though mining in the Andean Páramos was banned in 2016, some companies keep extracting coal in Pisba. Retrieved from https://www.greenpeace.org

Colombia

Prohibitions are also site-specific in Colombia, limiting the ban to the mountainous and biodiverse ecosystem of the Andean Páramos. As in the case of El Salvador, concerns over watershed pollution proved to be important, since this ecosystem provides most of the country with drinking water. According to Broad and Fischer-Mackey (2016) Colombia's Congress passed laws prohibiting mining, oil and gas activities in the páramos between 2010 and 2011, an important decision that received broad support from the civil society. In fact, a strong coalition of community groups proved to be fundamental in the safeguarding of this law, when it challenged the national government in a latter attempt to create a legal loophole to give new mining concessions. Following a decision made by Colombia's Constitutional Court, more than 347 mining licenses will be invalidated in this Andean ecosystem. It is worth mentioning that a similar law was recently discussed in Chile, but in June 2018 the glacier-protection bill was finally dropped (Millan Lombrana, 2018).

Argentina

In Argentina subsidiarity plays an important role, since mining policies can be enacted by both the national government and the provincial governments. As Casey Dawson has stated, even though Argentine law regulates mining at the national level, it also 'recognizes Argentinian provinces' ownership rights in natural resources that fall within their borders' (Dawson, 2014). To this day, 7 of 23 provinces have mining restrictions in place. Problems may arise when a national law, such as the Glacier Protection Act of 2010, is not followed by provinces that are heavily engaged with the extractive economy (Broad & Fischer-Mackey, 2016). The implementation of this law has proved to be challenging in Argentina, since it requires the cooperation of all the provincial governments along the Andean mountain range. But in the end, the power to make the final call remains at a lower goverment level.

FIG. 3.8 The Yasuni ITT initiative became known worldwide, but it was abandoned in 2013. In the aerial view, the construction of an oil access road to reach Block 31 within the national park. Image by Ivan Kashinsky. Retrieved from https://news.mongabay.com

Ecuador

The Yasuni National Park was designated in 1989 a UNESCO Biosphere Reserve. It is one of the most biodiverse forests on earth, with a core that houses more than 1,300 sorts of mammals, amphibians, reptiles, birds and fish, along with over 100,000 species of insects. In one hectare of rainforest alone, there are 655 different tree species -more than the United States and Canada combined (Del Hierro, 2009). But below the surface of this section of the Amazon River Basin lies the second largest reserve of crude oil in Ecuador, 'a block of concessions collectively known as the Ishpingo Tambococha Tiputini (ITT) field' (Marx, 2010, p. 1170). Plans to build a 54-km road into the park aimed to facilitate access to the oil fields, triggered an international campaign to protect the forest leaded by a group of Ecuadorian environmentalists in 2003. Pressure from civil society and evidence-based reports prompted the national government to put a moratorium on the extractive project and to come up with an innovative strategy, better known as the Yasuni ITT initiative.

The proposal announced by president Rafael Correa consisted in the creation of an international trust fund plan for the conservation of the national park. In other words, Ecuador would protect the rainforest and keep the oil below the ground in exchange for $3.6 billion dollars -half of the value of the oil deposits- paid by industrialized countries over 13 years. But Correa also warned that if the international community failed to pay, he would undertake the oil extraction project. The United Nations agreed to oversee the trust fund, claiming that 'the agreement could serve as a model for protecting ecosystems around the world' (Marx, 2010, p. 1171). Unfortunately, the project did not go through. In 2013 president Correa abandoned the initiative after considering that payments were not sufficient. He declared that the world had failed Ecuador and accused industrialized countries of being hypocrites in their quest to mitigate the effects of climate change (AP, 2013). Today, oil is being extracted in the Yasuni National Park.

FIG. 3.9 The Law of the Right to Prior Consultation approved by the Peruvian Congress in 2011 is, theoretically, the voice of indigenous and native peoples in Peru. Retrieved from https://consultape.com

FIG. 3.10 A hazard sign that restricts access to a Superfund site in New Hampshire. Retrieved from https://www.nhpr.org/

FIG. 3.11 A part of the Elizabeth Mine site, an abandoned copper mine in South Strafford, Vermont, was re-purposed as a solar farm. Retrieved from https://vermontbiz.com

Perú

It is well known that many resource-rich regions around the world are also peripheral ones, usually inhabited by indigenous, under-represented populations. Most of the time these groups are unable to enjoy basic human rights to the same degree as their fellow countrymen, and for this reason the International Labour Organization established in 1989 the right to prior consultation in its convention concerning Indigenous and Tribal Peoples in Independent Countries (C169). This right was ratified by 15 Latin American countries, including the Republic of Peru. In 2011 the Peruvian Congress passed by a unanimous vote the new Law of the Right to Prior Consultation to Indigenous or Native Peoples -Ley del Derecho a la Consulta Previa a los Pueblos Indígenas u Originarios (Ley No. 29785, 2011). In a nutshell, the law gave indigenous populations the right to be consulted regarding the extractive projects that may take place in their territories or endanger them in some way. According to this piece of legislation, once an agreement has been reached between a given community and the state, it is binding and enforceable at the administrative and judiciary levels. Although this represents an important milestone in terms of the recognition of human rights, and provides a legal framework for under-represented communities, it has been reported that in some cases the law has been bypassed. Integration of such a law with a spatial component, like in the case of the Ngäbé and Büglé territories in Panama, could prove a more solid approach in the future.

United States

In 1978, during the construction of the LaSalle Expressway, over 20,000 tons of toxic waste was discovered in Love Canal, a neighborhood within the city of Niagara Falls, now recognized as America's most notorious dumpsite (Bélanger, 2016). Along with the Valley of the Drums, Love Canal received national attention once the public learned about the risks posed by post-industrial contaminated sites, both to human health and the environment. In response, Congress created in December 1980 the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund. It is one of the main programs of the Environmental Protection Agency (EPA), and it has the authority to clean up contaminated sites either by compelling the responsible parties to perform the cleanups themselves, or by making them reimburse the federal government for EPA-led cleanup work. In cases where there is no viable responsible party, Superfund gives the EPA the necessary funds for the cleanup, recovering the costs from polluters with the aid of the U.S. Department of Justice.

One of the main tasks of the EPA consists in the elaboration of the National Priorities List (NPL), which identifies sites throughout the territory that may threaten the health of people and places with the presence of hazardous pollutants, substances and contaminants. The methods for the assessment of those sites and the cleanup remedies that are often selected have been questioned by many, but as Harris, Vandeven and Tilchin (2003) have asserted, the program has matured gracefully over time. It must be said that even though it is an important program with many successful stories, it does not question the fundamental problems of the extractive model. It is essentially palliative in its nature.

FIG. 3.12 Sergio Campusano, member of the Diaguita Huascoaltinos Indigenous and Agricultural Community, protesting against the Pascua-Lama gold mining mega-project in 2009. Retrieved from https://pascualamaproject.wordpress.com

FIG. 3.13 The Collío-Valdés family poses for a family portrait. Image by Alberto Barba Pardal. Retrieved from https://www.equaltimes.org

FIG. 3.14 The Gaby copper mine, in the middle of the Atacama desert, managed by CODELCO. Retrieved from https://www.aggreko.com

Chile

As Paula Butler suggests (2018), Chile is a good example of how a resource-rich country can make an efficient use of the extractive revenues to improve the living conditions of the nation as a whole, overcoming what economists have called the 'resource curse'. Indeed, the country's institutional and political reforms in the early 1990s allowed the mining sector to play a significant role in the national economy, keeping inflation and unemployment at very low levels, and reducing poverty rates. Today, copper mining represents 60% of Chile's exports and 20% its gross domestic product, and it has undoubtedly boosted the country's economic growth. The CSF or Copper Stabilization Fund, created in 1985, proved to be a very prudent policy to buffer the national economy against market instability and major commodity price fluctuations. This fund not only provides a stable income to the government when copper prices are low, it also avoids inflation and other economic atrophies when there are large influxes of revenue. According to Butler (2018), the implementation of such policies suggests that there is an important political component to the 'resource curse'.

It must be said that important conflicts of water pollution, deterritorialization and human rights violations have resulted from Chile's dependence on resource extraction. The dispute between the Diaguita Huascoaltinos community with Barrick Gold Corporation (Bélanger, 2018), or between the Mapuche people and the forestry companies that benefit from the exploitation of their lands (Barba Pardal, 2018), are just a few of many examples availabe. In addition, we should always remember that metals are non-renewable resources; so the benefits that derive from these policies will come to an end one day. In Chile, the visualization of the whole picture is useful to understand how resource extraction remains a wicked problem with no easy solution (Rittel & Webber, 1973), even when it is framed in a development project for the whole country.

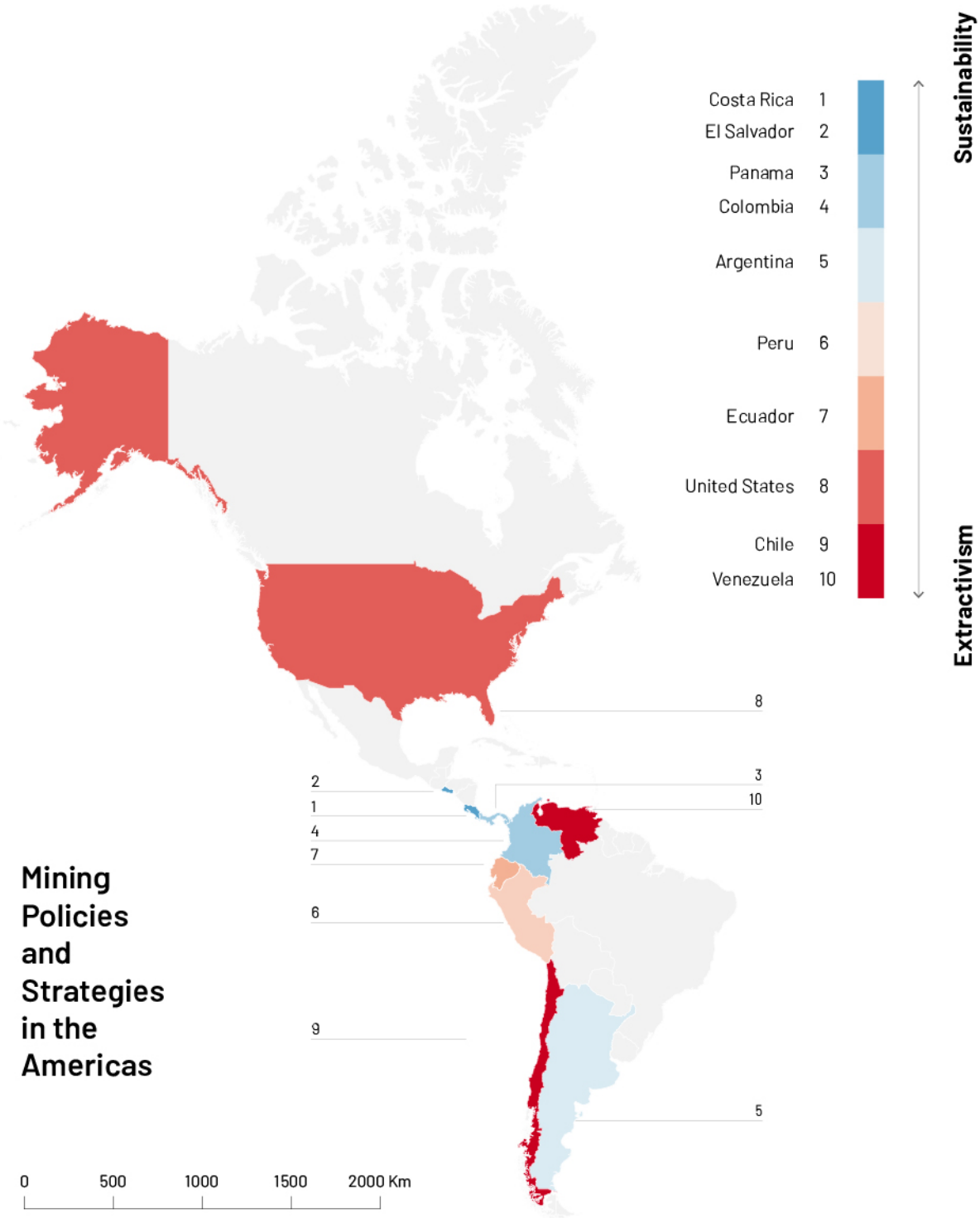
FIG. 3.15 Aerial view of Ciudad Guayana. The Macagua dams can be seen to the left. Retrieved from https://saladeinfo.wordpress.com

FIG. 3.16 A SIDOR steel plant stands rusting away in Ciudad Guayana, due to the lack of maintenance and economic mismanagement that has prevailed in the state-owned industries over the last 20 years. Photograph taken by Rodrigo Abd. Retrieved from https://apimagesblog.com

Venezuela

According to Burchardt & Dietz (2010), the term 'neo-extractivism' may be used to differentiate between extractivism as a neoliberal model and neo-extractivism as a development project set by a government that aims to improve the living conditions of its people, making use of the revenues provided by the extraction of natural resources. This rent seeking approach has been the main policy of the Venezuelan government since the 1920s, when oil extraction became the main pillar of the national economy. But already in 1936, an important Venezuelan intellectual called Arturo Uslar Pietri wrote an article in a local newspaper calling for the 'sowing of the oil'. He thought that the oil boom couldn't last forever, and that the wisest thing the central government could do was to reinvest the oil revenues in the creation of national industries and agriculture to create a productive and healthy economy (Uslar Pietri, 1936). This vision was taken forward by President Rómulo Betancourt when democracy was installed in Venezuela in 1959, and it could be argued that it has been the only time such an attempt has been made. The main policy of his government was to overcome the import dependency by strengthening and diversifying the national economy, placing a particular interest in the industrialization of the country (Angotti, 2001). This is why the iron and bauxite deposits of Guayana, along with the incredible potential for hydroelectric power provided by the Caroní River and the ease of accessibility to the Atlantic Ocean through the Orinoco and its delta, made the Venezuelan Guayana a desirable location for the state-owned investments.

To manage the extraction of natural resources and the development of the national industries, the government of Betancourt created the CVG (Corporación Venezolana de Guayana), a decentralized state-owned corporation modelled after the Tennessee Valley Authority. But in truth, the mission of the CVG went far beyond extraction. As a regional authority it was also responsible for the planning, building and management of the new town of Ciudad Guayana, for the construction of an impressive system of hydroelectric dams that still today provides up to 70% of the national energy demand, and for adding value to the extracted metals by stimulating the production of finished and semi-finished goods further downstream. This decentralized state-owned corporation also played an important role in the creation of universities, technical institutes and research centers in the region, creating new technology while improving the opportunities for personal and professional growth of those who lived in the Venezuelan Guayana for over 40 years. Unfortunately, the reach and the competences of this regional authority were centralized once again during the years of the Bolivarian Revolution installed by Hugo Chávez. Today, the CVG stands as nothing more than the caretaker of the Venezuelan Guayana (Prat, 2012). But its successful experience from the 1960 up to 2005 served as a model for many resource-rich countries across the world.


Mining Policies and Strategies in the Americas
Costa Rica 1
El Salvador 2
Panama 3
Colombia 4
Argentina 5
Peru 6
Ecuador 7
United States 8
Chile 9
Venezuela 10
Sustainability
Extractivism
0 500 1000 1500 2000 Km

Which way to go from here?

The investigation of the selected case studies within the Americas evidenced a wide range of policies, strategies and financial mechanisms that deal with mining in a variety of ways. Some countries have opted for banning mining altogether at the national level, passing laws and even creating a series of marketing tools that pay citizens for the protection of valuable environments. Others have prohibited mining operations in specific areas; either to protect indigenous territories, as in the case of Panama, or to guarantee the quality of drinking water from the source, like in Colombia or Argentina. The international trust fund plan proposed by the Ecuadorian government, which is nothing more but a large-scale conservation agreement, remains an interesting model even though it did not prove successful in the specific case of the Yasuni national park. Finally, there are also a series of countries that openly embrace mining and integrate this sector into a broader economic strategy, using the revenues from extraction to improve the living conditions of the population. Some of these countries have opted for prudent economic policies, such as a commodity stabilization fund; others have lended lands, funding and power to a decentralized regional authority in charge of managing the development of an entire territory.

CLASSIFICATION OF SELECTED CASE STUDIES

COUNTRY	TYPE OF STRATEGY / POLICY	SCALE
Costa Rica	Open-Pit Mining Ban	National Level
Costa Rica	Payments for Environmental Services	National Level
Costa Rica	Fund for Sustainable Biodiversity	National Level
El Salvador	Moratorium / De Facto Mining Ban	National Level
Panama	Mining Ban on Indigenous Territories	Site Specific
Colombia	Mining Ban on the Andean Páramos	Site Specific
Argentina	Glacier Protection Act	National Level
Argentina	Subsidiarity / Regional Autonomy on Mining	Regional Level
Ecuador	International Trust Fund	Site Specific
United States	Compensation and Liability Act	National Level
Peru	Law on Prior Consultation	National Level
Chile	Commodity Stabilization Fund	National Level
Venezuela	Decentralized Regional Corporation	Regional Level

FIG. 3.17 Range of mining policies and strategies among the selected case studies in the Americas. Source: made by the author

In any case, the number of examples that have shifted away from resource extraction, or that at least have managed to reduce their dependence on this economy for environmental and social reasons, reasserts the idea that a 'country that has the resources can say "No" to mining' (Watkins, 2018, p.48). There is a way out of the resource curse, and it is not a far-fetched proposal. But it is crucial to remember that most of these policies and strategies were triggered by waves of pressure from activists, indigenous populations, concerned environmentalists, or all of them simultaneously with the support of an important part of the population. Especially when facing and important threat or right after some damage had already been done.

PART 2

Understanding the Territory

The role of urbanism in peripheral areas under global pressures

"(...) a virginal world, inhabited by men who continue living as in the days of the Conquest and are still motivated by the same forces"

[Alejo Carpentier, Carteles]

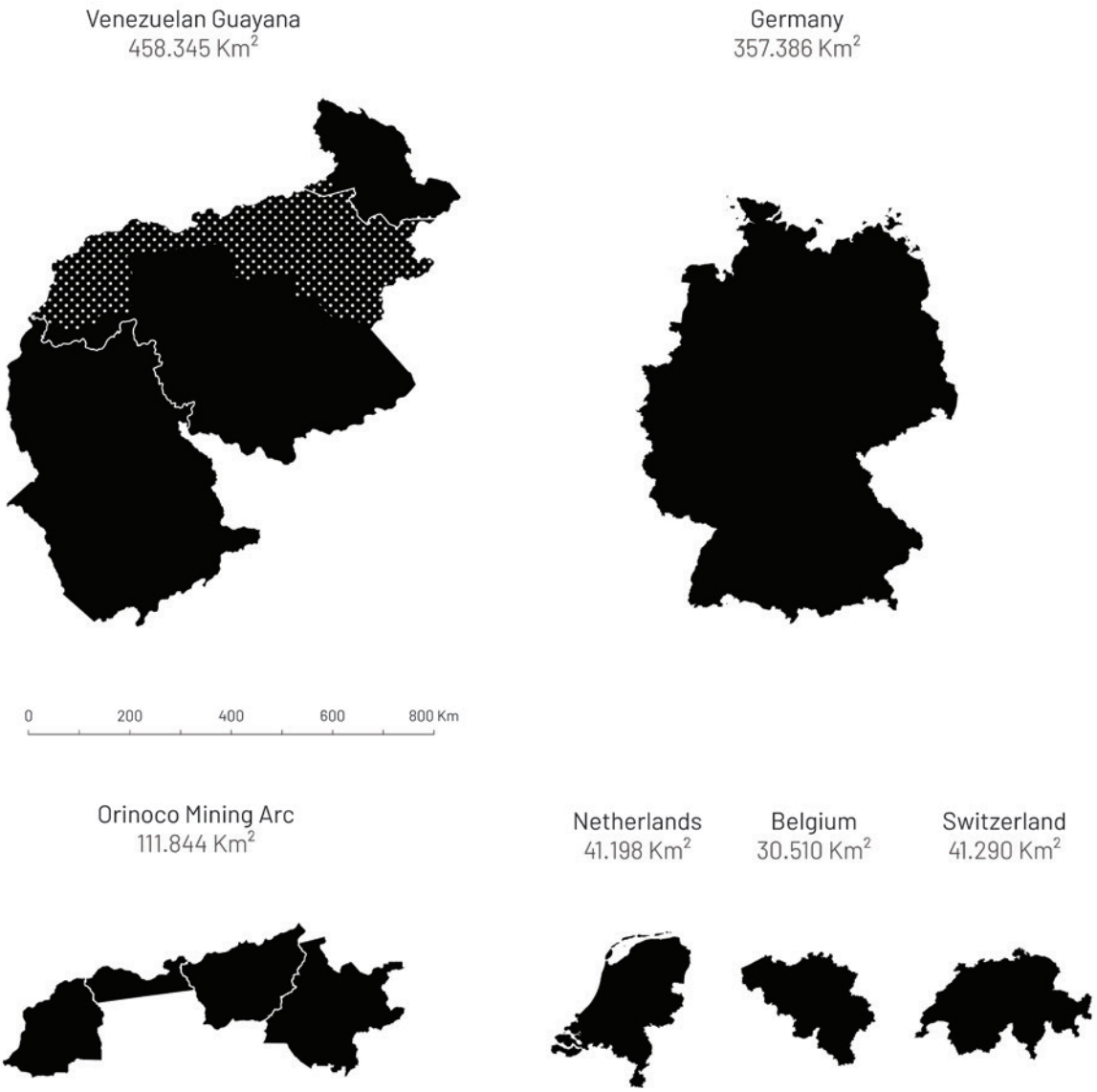


FIG. 3.18 The Venezuelan Guayana is the largest and least populated region of the country. In terms of surface area, it is bigger than the whole of Germany. But its entire population is just a little more than two million inhabitants. On one side, the wide Orinoco River has difficulted human occupation since colonial times, and on the other most of the Guayana Region is occupied by large areas of tropical moist forests. Still today, this region shows big problems of inaccessibility to the national economy, to other people, and to basic services such as education and health facilities.

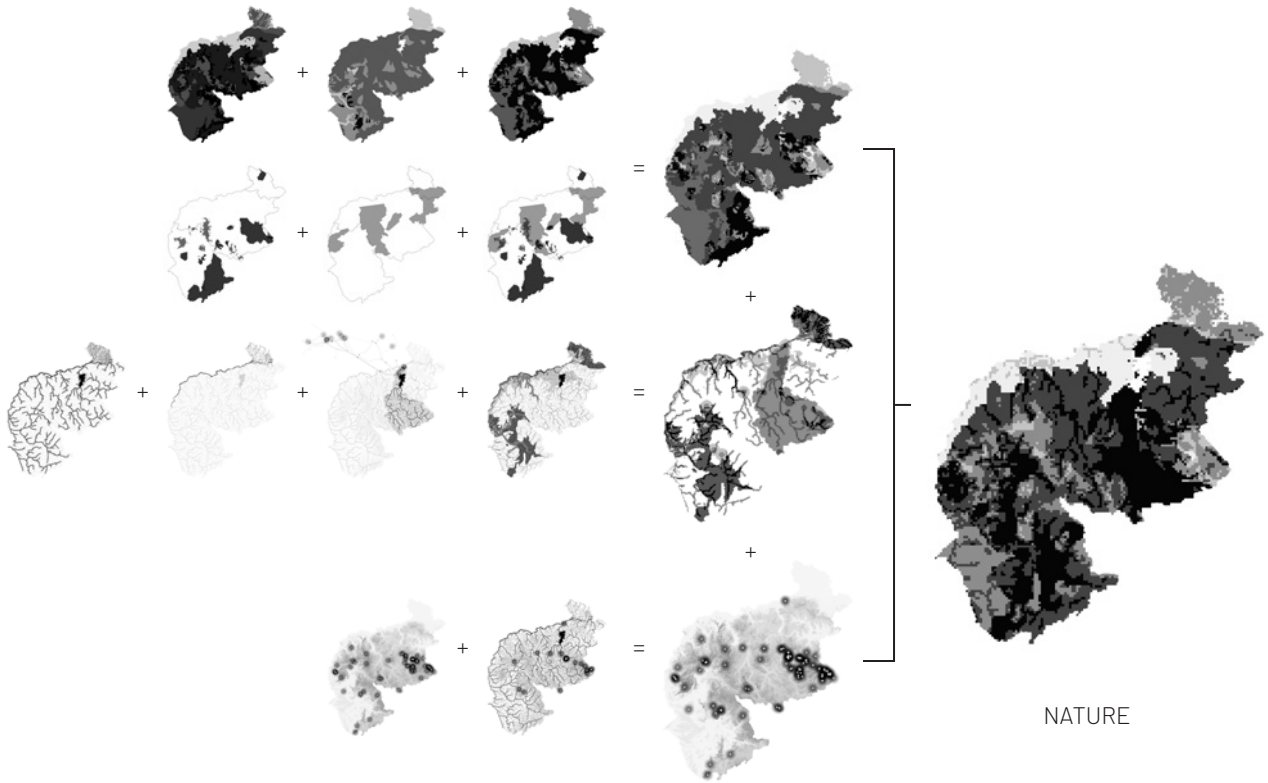
4 – Regional Scale Analysis

Possibilities and Limitations in the Venezuelan Guayana

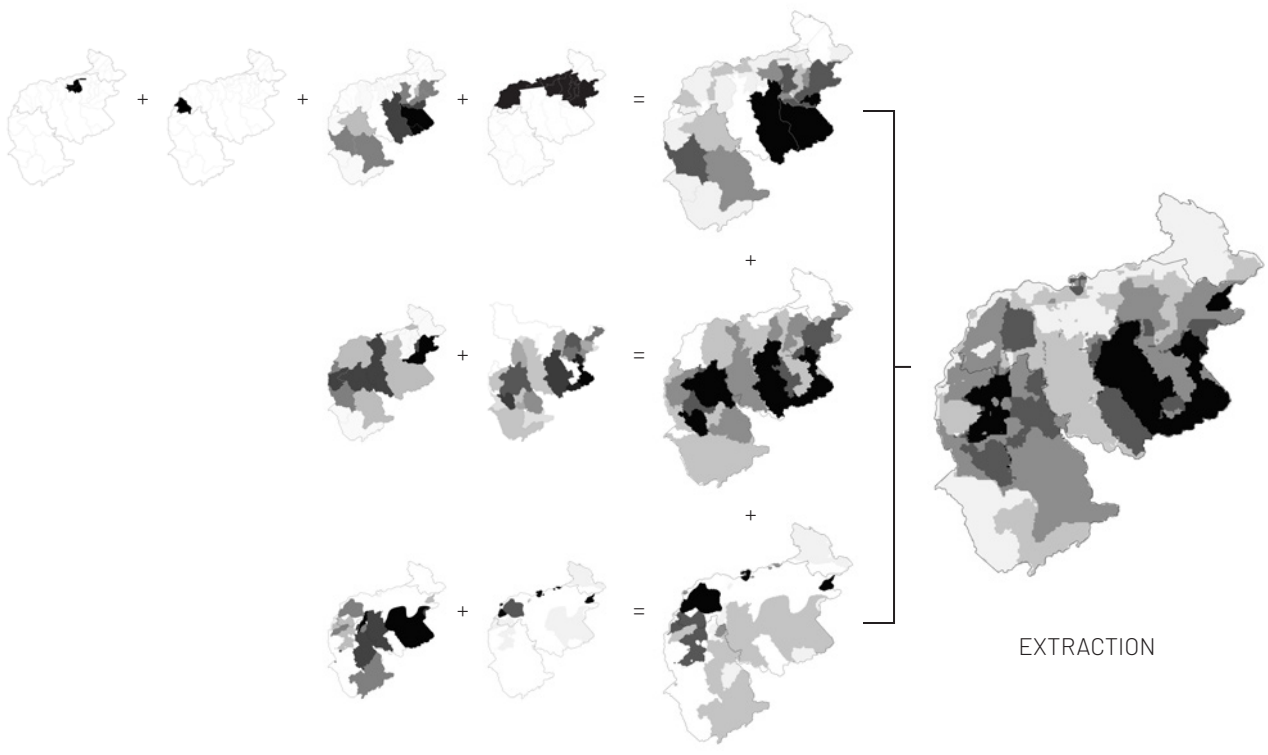
FIG. 4.1 Overview of the regional scale analysis of the Venezuelan Guayana (in the next pages), taking from the suitability assessment developed by Ian McHarg. Several aspects have been evaluated within four themes, using a series of indicators, to arrive at some conclusions. Source: made by the author.

The Venezuelan Guayana is the largest region of the country. It has more than 450,000 square kilometres, a land area greater than the whole of many European countries. Therefore, a regional scale analysis was made to categorize the territory and to abstract the problem, using a series of indicators that were carefully selected and spatialized. The method used for the analysis takes from the suitability assessment described by Ian McHarg in 'Design with Nature' (1971), since four different themes were evaluated through a series of maps that spatialized relevant aspects of the region. All the maps were ranked individually using a scale of values, and this method gave an idea of which are the most -and least- suitable areas for certain functions; which are the places where certain aspects have a greater impact; or which are the areas where certain activities have a greater concentration. These maps were then overlaid according to their themes, and the resulting composite maps helped to recognize the spatial distribution of different problems that can be found in different areas of the Venezuelan Guayana.

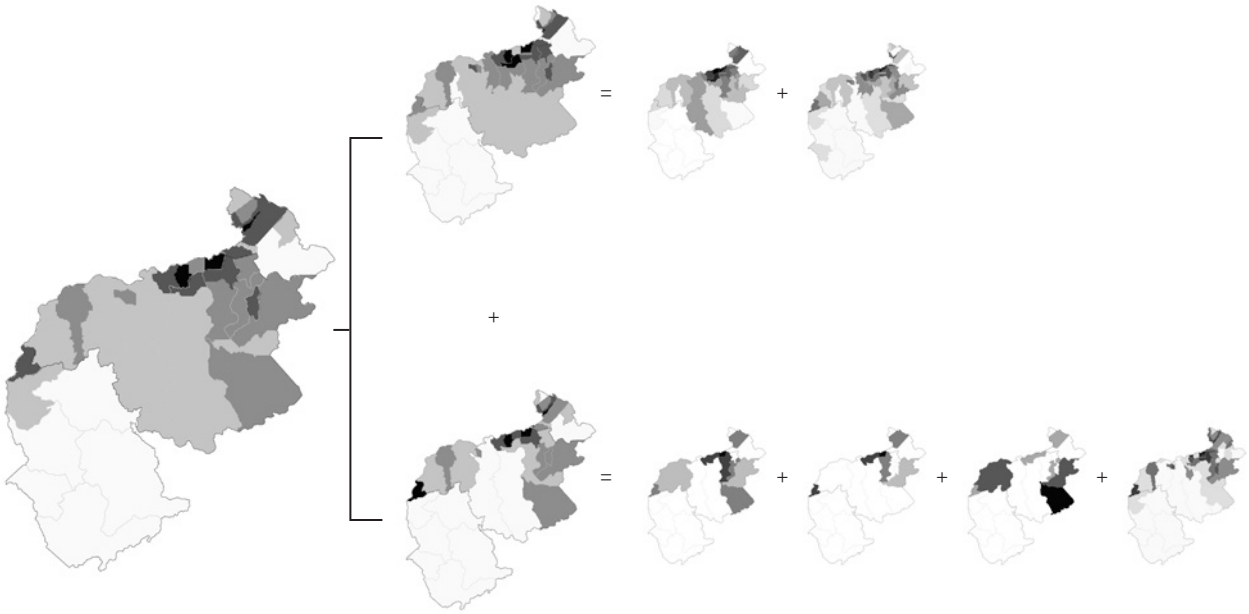
The themes chosen for this regional scale analysis were Peripherality, Extraction, Nature and Occupation. The names may seem very generic, but that is because the specificity of the analysis is related to the set of indicators used to measure each theme. The variables used to measure peripherality, for example, were the level of integration of each parish (the smallest administrative unit) to the national road network; the road density of each parish; their level of accessibility to health and secondary education facilities; their population density, used to measure to what extent an individual has access to other people; and the number of airports that can be found in each municipality. The overlay of these different variables resulted in a peripherality index, the most important composite map of this analysis. It revealed that even if the Venezuelan Guayana is a peripheral region with extremely low densities, there are integrated and accessible areas with large cities in the north, peripheral towns with low accessibility to basic services, and remote settlements that can only be accessed by boat or small planes. Other indicators were used to measure the other three themes. But the different conclusion maps that resulted for each one of them were overlaid against the peripherality index map. This systematic process proved to be useful to categorize the region according to the conflicts and opportunities that certain areas present. It must be mentioned that there is plenty of room for improvement in this regional scale analysis. The results could be used for further research and interpretation, but also the methodology might be revised by others. Recommendations for certain policies and strategies might already be made for each one of the outlined categories.



NATURE



EXTRACTION



PERIPHERALITY

OCCUPATION

FIG. 4.2 Deforestation caused by illegal small-scale gold mining in the State of Bolívar. This mine, operated by the indigenous community of Campo Alegre, has polluted and degraded more than 81 hectares of grasslands inside the Canaima National Park. It is part of what some scholars call as the Indigenous Mining Arc (Lozada, 2017). Photograph taken by Charles Brwer-Carías. Source: Explora Magazine, 2018.

4.1 – **Extraction**

Mapping the extractive havoc in the Venezuelan Guayana

Iron ore and bauxite can only be found in mineral veins that are very site-specific. The certainty of having large deposits in one location has made their extraction a profitable business for the national government. The iron ore extraction sites of Cerro Bolívar and San Isidro are relatively close to the industrial new town of Ciudad Piar, and from there the mineral is transported by railway to the mills of Ciudad Guayana. Bauxite mines can be found in Los Pijiguaos, between Puerto Ayacucho and Caicara del Orinoco. The extraction site is more than 300 kilometers away for the processing site that transforms the raw mineral into aluminum in the industrial platform of Matanzas, also in Ciudad Guayana. The location of these industrial and state-run extraction sites were taken as an indicator, using the parishes as the aggregation unit, since they have traditionally provided employments to large numbers of people both directly and indirectly. In other words, the attraction reach of these extraction sites generally goes far beyond the town where they are located.

Compared to iron and bauxite extraction, gold mining patterns are extremely expansive. This has to do with the fact that in the Venezuelan Guayana alluvial gold placers are dispersed through certain parts of the territory. In consequence, illegal small-scale gold miners perform their jobs in a rather nomadic fashion. A recent study on illegal mining published by RAISG, the Amazon Geo-Referenced Socio-Environmental Network, revealed that there are 1899 illegal mining points in the Venezuelan Guayana (2018). Therefore, illegal gold mines were also used as an indicator, and a classification was made at the parish level in relation to the number of mining points within them. In terms of the employment capacity of this activity, the International Crisis Group has reported that there are around 300.000 people depending on illegal small-scale gold extraction for their subsistence (2019).

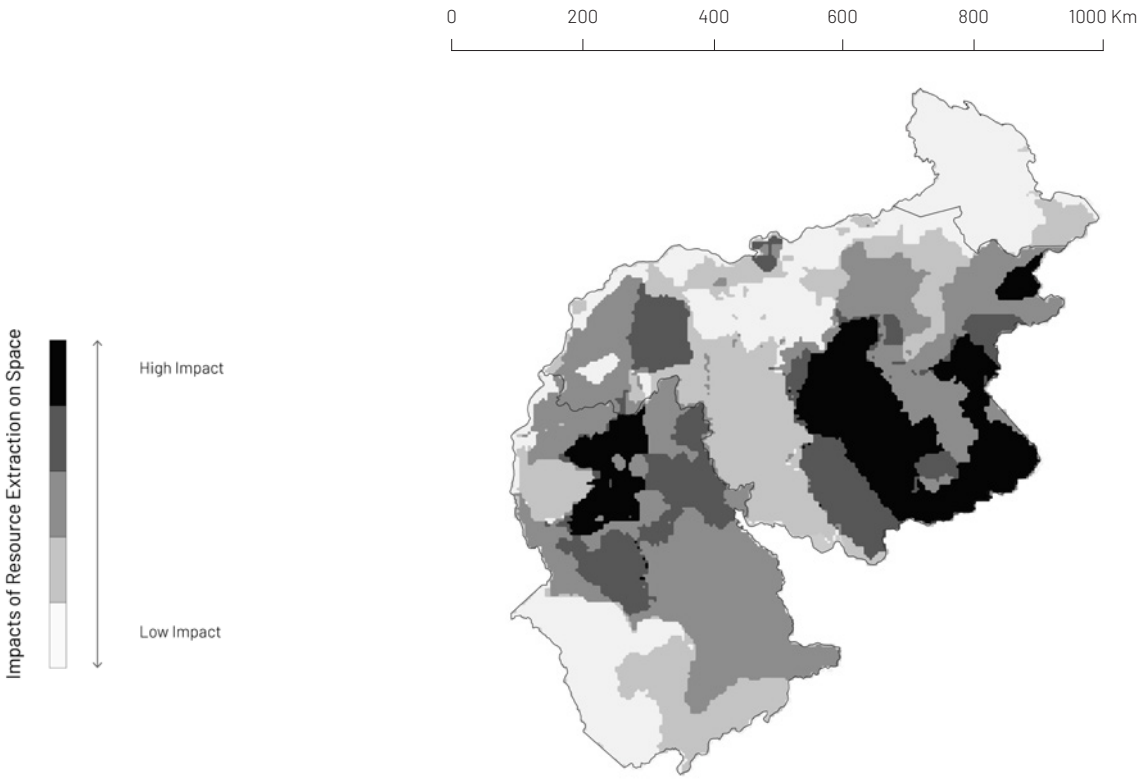


FIG. 4.3 Conclusion map that shows the spatial distribution of the threats posed by mining operations in the Venezuelan Guayana, especially by illegal small-scale gold mining. Source: made by the author.

The environmental and social byproducts of mining were also used as indicators to measure the reach of this activity. Watershed pollution with mercury and other heavy metals is compromising the health of the region's inhabitants further downstream, even if they are located kilometers away from the mines. Mercury pollution affects the nervous, digestive and inmune system, but it also has an impact on gongenital anomalies. For this reason, the most polluted sub-basins of the region were classified according to the number of illegal small-scale gold mines within them. Deforestation and water pollution in small-scale mining areas, along with the nomadic behavior of miners, have also contributed to the outbreak of malaria throughout the region. According to the World Health Organization, the highest concentration of confirmed cases of malaria in the world is in the Venezuelan Guayana. Therefore, the number of confirmed cases by municipality, in 2017, were used as an important variable. This data was retrieved from the official website of the Pan American Health Organization (PAHO).

But beyond the environmental damages and the health problems that illegal gold mining is creating, there is also an issue of human rights. Especially around the indigenous communities that have been occupying this territory long before the arrival of Europeans. The existence of natural resources on the lands they occupy is creating conflicts between the national government, illegal miners and indigenous peoples. Forced relocations, violence and new forms of slavery are some of the social byproducts of mining over these groups; but also dependence on extraction, since some communities are operating small-scale gold mines willingly and without coercion, at the expense of their land. The number of illegal gold mines inside indigenous territories was also used as an indicator in this research.

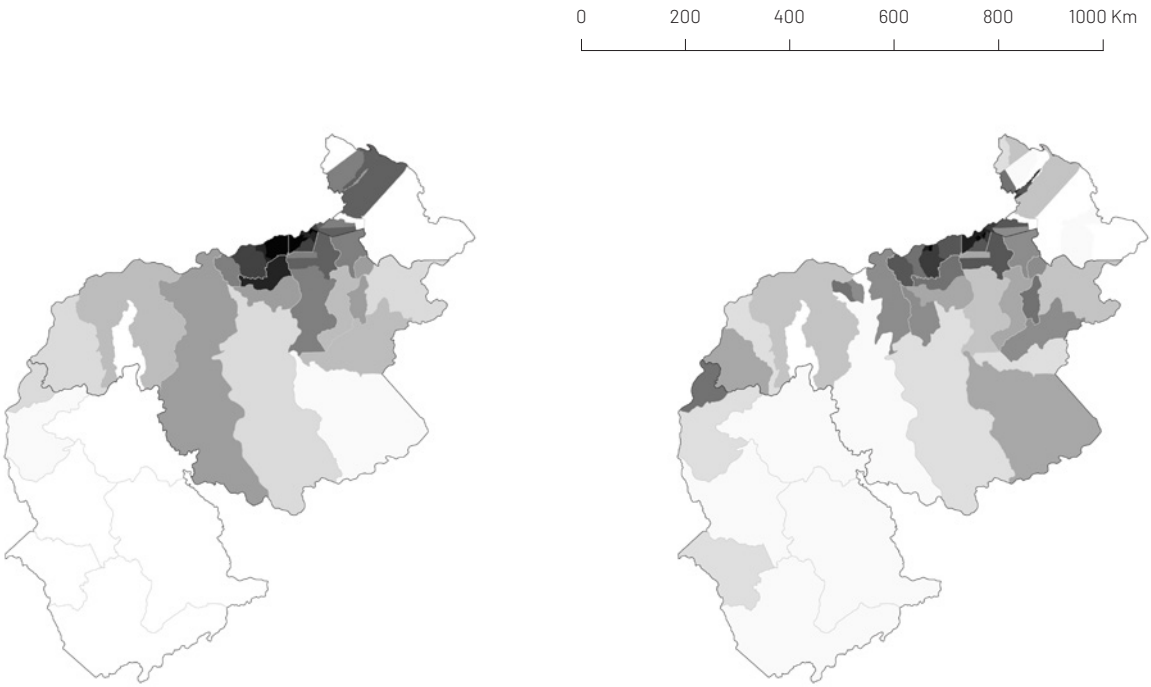
FIG. 4.4 The main square of Icabarú, a small and remote settlement in the Gran Sabana Municipality. This dirt-road village has little more than 2,000 inhabitants, and almost all of them depend on the illegal extraction of gold and diamonds from the surroundings. It is located next to the border with Brazil, and 120 kilometres away from the town of Santa Elena de Uairén, where some basic services may be accessed. Photograph taken by Dagne Cobo Buschbec. Retrieved from http://elestimulo.com

4.2 – **Peripherality**

Accessibility and integration in the Venezuelan Guayana

The Venezuelan Guayana is the largest and least populated region of the country. In terms of surface area, it is bigger than the whole of Germany. But its entire population is just a little more than two million inhabitants. On one side, the wide Orinoco River has difficulted human occupation since colonial times; and on the other, most of the region is covered by tropical moist forests. Still today, the region shows problems of inaccessibility to the national economy, to other people, and to basic services such as education and health facilities. Even though big cities like Ciudad Guayana or Ciudad Bolívar are very well served and integrated to the national road network through a series of bridges or ferry terminals that cross the Orinoco River, the rest of the region does not share the same privileges. Lack of critical mass for the construction of basic infrastructure may be the reason for that, since the biggest towns do not exceed 30,000 inhabitants in average. The result of these differences is a gradient or peripherality that stretches from the banks of the Orinoco River down to the borderland with Brazil and into the Amazon forest.

One of the sub-research questions this work puts forward has to do with the relationship between peripherality and dependence on extraction. Are lack of opportunities in remote and peripheral towns pushing people to a vicious cycle of dependence on mining? A series of maps were made with a variety of indicators to visualize a gradient of peripherality throughout the region. The level of integration to the national road network and the road density of each parish were among the variables used. The level of integration measured how accessible an area is in relation to others at the national level. This index resulted from a global angular integration analysis using the Place Syntax tool on QGIS, and the median was then transferred to the smallest administrative governance unit. Since areas are fairly



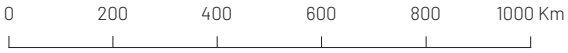
Integration to the National Road Network
Low Integration - High Integration

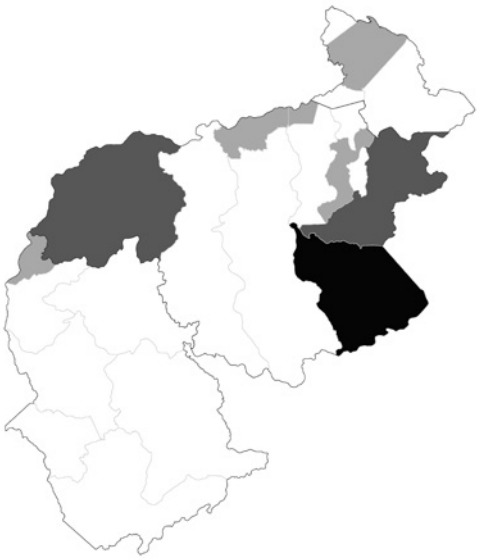
Linear Kilometres of Road per Km² of Land Area
Least road density - More road density

FIG. 4.5 The level of integration of the smallest administrative unit to the national road network was used as one of the indicators that would determine the degree of peripherality of the region. Because of the large surface area of some existing parishes, the result was weighed with the road density, used as another indcator. Source: made by the author.

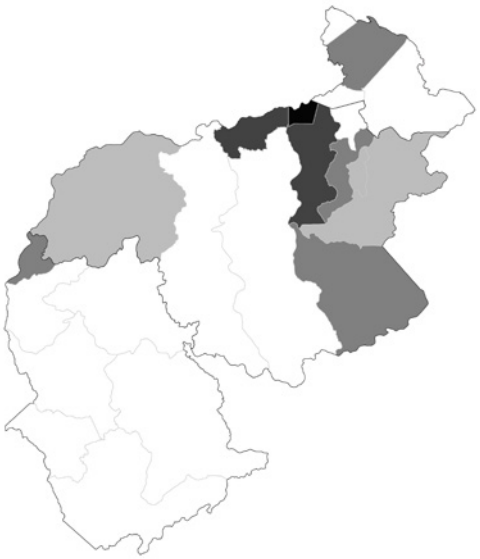
large, the analysis indicated some parishes as integrated ones even if in reality that was only true for a number of centres in a small part of the administrative unit. For that reason, that variable was complemented with the road density to get a more accurate idea of how accessible parishes really are. Other indicators were also used to measure how peripheral an area is, such as the number of airports, health facilities, technical institutes and univeristies in each municipality. These variables were weighed at the municipality level because their power of attraction goes beyond the parish. Finally, access to other people was also used as an indicator by using the population density of each parish. This variable is particularly important, since access to people can be a determinant factor on the creation of social networks, innovation and creativity. It was not a surprise to se that the most accessible and integrated parts of the Venezuelan Guayana are also the ones with the highest densities.

The final conclusion of this analysis was a Peripherality Index map, which shows different gradients of peripherality throughout the region. There is a long sretch of urbanized areas that is well served and integrated to the national economy, which goes from Ciudad Bolívar to the city of Tucupita in the Orinoco Delta. Puerto Ayacucho, on the westernmost part of the region, stands as an island even if it is well served and integrated. A peripheral area stretches to the south from Ciudad Guayana to the town of Santa Elena de Uairen, along the regional trunk road that connects Venezuela with Brazil. The rest of the region -and especially the State of Amazonas- was considered remote. Most of this region is covered by forests and can only be accessed by plane or boat. Less than 1% of the national population lives here, and most of that population is made by indigenous groups.

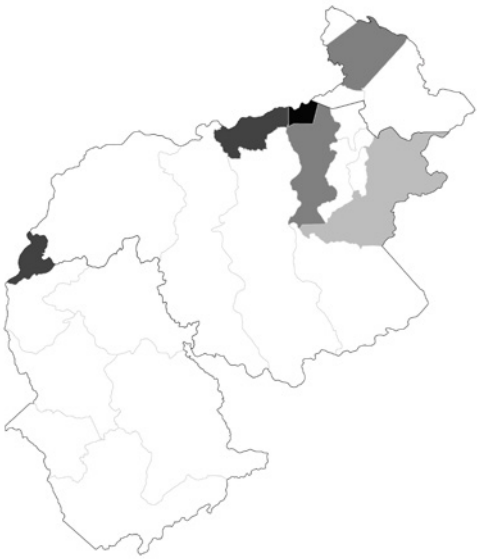




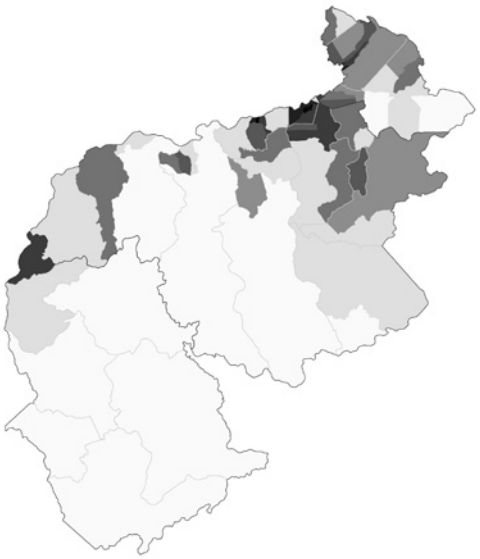
Accessibility to Airports
No airports - Most airports



Accessibility to Health Facilities
No health facilities - Most health facilities



Accessibility to Secondary Educational Facilities
No educational facilities - Most educational facilities



Accessibility to Other People
Least population density - Most population density

FIG. 4.6 Other indicators were also used to determine the degree of peripherality of the different parts of the region. The level of accessibility of the smallest administrative units to health and secondary educational facilities were important indicators. And access to other people was measured by making use of the population density of each parish. Finally, consideration was also given to the number of airports inside the different municipalities. Regarding this point, an important observation can be made for the Gran Sabana Municipality. It has more air strips than the rest of the region, but this has to do with the fact that some areas can only be accessed by plane or boat. Source: made by the author.

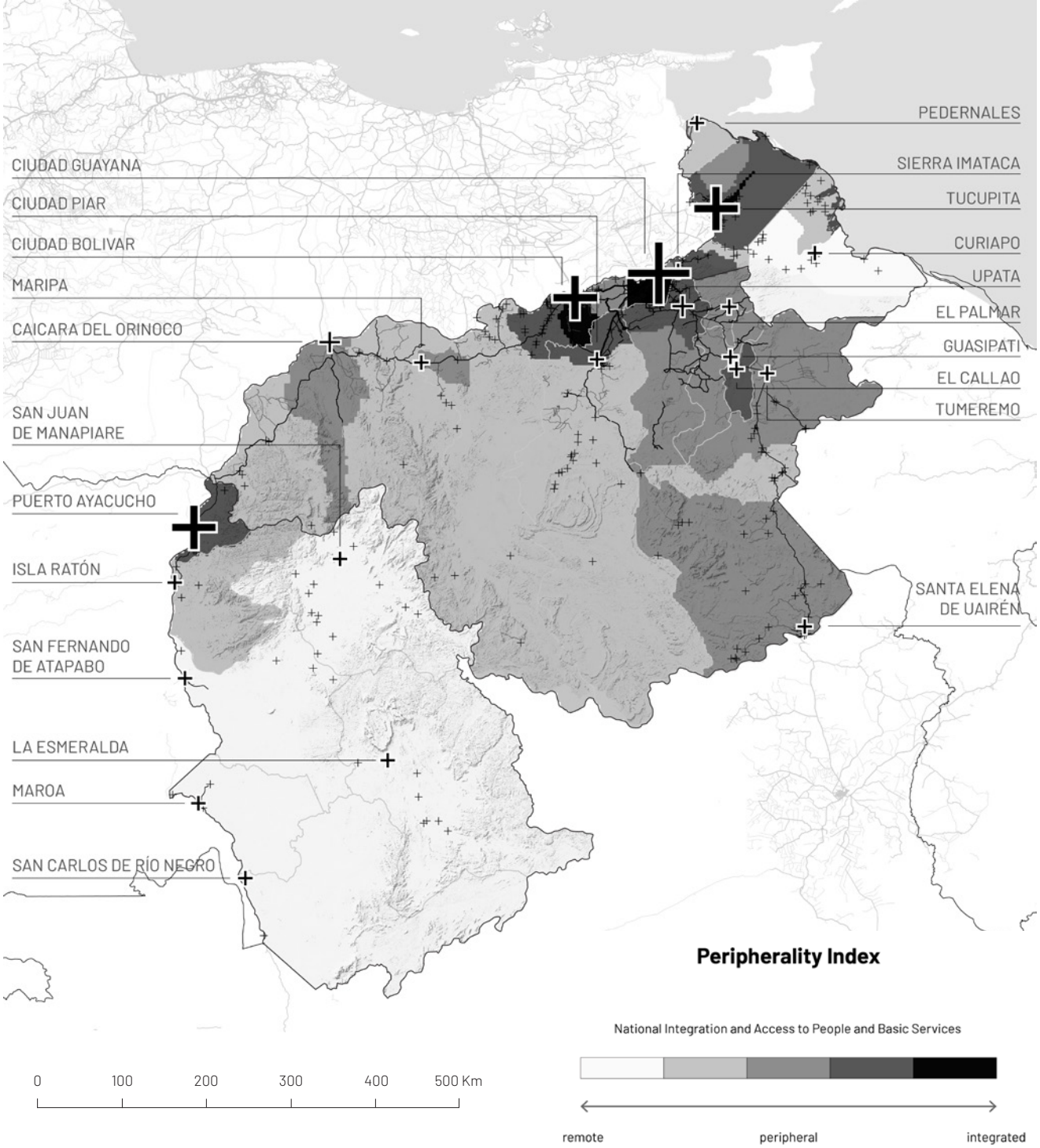


FIG. 4.7 Classification of municipalities in the Venezuelan Guayana, according to their level of integration the national road network and their accessibility to basic goods and services. The analysis revealed that there are three types of areas in the region: integrated urban areas, remote towns and villages, and a large span of peripheral areas in between. The large cities of the north, along the Orinoco River, have good access to health, education and flight connections to the rest of the country; and most of them are well connected to the national road network through a series of highways and several bridges or ferry services that cross the Orinoco River.

Remote towns and villages can be found especially in the State of Amazonas. Only the state capital, Puerto Ayacucho, is provided with a decent number of basic services with relatively good quality. But most of the remote settlements in the state require several hours and multiple modes of transportation to get to this city. The rest of the centres can be regarded as peripheral ones, since few services can be found and usually with a relatively low quality. People are forced to leave peripheral areas to access better services, or to seek opportunities for self-betterment. Those who stay depend on few economic alternatives and in resource extraction. Source: made by the author.

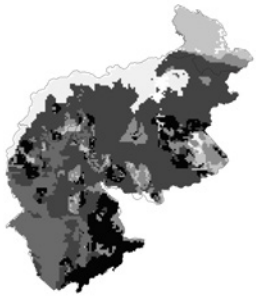
FIG. 4.8 The Angel Falls, or Kerepakupai Merú, is the largest uninterrupted waterfall in the world. It is located inside the Canaima National Park, in the State of Bolívar, and drops for more than 800 meters from the top of the Auyán-Tepui. This is one of the many unique features with great ecological and scientific value that can be found in the region. Retrieved from https://www.naturetrek.co.uk

4.3 – **Nature**

Mapping the potential and the fragility of vegetation

The Guiana Shield is one of the oldest geological formations on earth, originated in the Precambrian more than 1.7 billion years ago. And the tropical moist forest that covers its surface has been there for more than 20 million years. As the whole of the Amazon rainforest, it is one of the most species-rich terrestrial ecosystems in the world (Hoorn, 2010). Nevertheless, this great biodiversity is extremely fragile and vulnerable to human activity. The soils of the Venezuelan Guayana are very poor and have low grades of fertility. When a part of the rainforest is destroyed by mining, small-scale agriculture or livestock farming, the soil does not have the capacity to support the regeneration of that area in the short term; and primary forest species lost to human action will only be able to grow again after very long periods of time.

Geographical conditions, the vastness and inaccessibility of the territory, but most particularly time, have contributed to the formation of this rich rainforest on top of such poor soil conditions. According to Carlos Peláez (education and sustainability director of Provita, a Venezuelan environmental NGO), the soil does not support the forest in this part of the world; it is the forest that maintains the soil. For this reason, a soil fertility capability classification was used as an indicator. This assessment was made by giving a value to the different soil orders, according to the USDA universal soil classification system. Almost all soils have low fertility in this region, so the value scale goes from extremely low fertility soils to relatively low fertility soils. The vulnerability of the different ecoregions was also used as a variable. Having understood the low capacity of the tropical moist forests to regenerate, these ecoregions were deemed as the most vulnerable ones. Savannas and grasslands were considered as the least vulnerable ecoregions, since shrubs and grasses



Preservation of Vegetation
Low priority - High priority for preservation

FIG. 4.9 Conclusive map that shows the spatial distribution of the areas with the greatest potential, but also the greatest fragility, related to land features and vegetation. Source: made by the author.

tend to have a greater capacity to recover from external harms. Mangroves and wetlands, along with the Pantepui ecoregion, stand in between. This indicator was deemed critical in the assessment of the natural system, and for this reason more value was placed to this particular indicator when creating the composite map with MapAlgebra tool in ArcGIS.

Land features of unique scenic value were also mapped, revealing the system of Tepuis of the Guayana Highlands. Tepuis are isolated table-top mountains, which host of a unique array of endemic plant and animal species on top. Since they constitute one of the main touristic attractions of this vast region, they were used as a separate indicator that helps to visualize areas with high potential for ecotourism. And finally, the system of areas under special regimes of administration -Áreas Bajo Régimen de Administración Especial, or ABRAE by their acronym in Spanish- were also mapped to highlight natural protected areas of unique scientific value in the Venezuelan Guayana. These areas are legally binding, and consist of a series of national parks, natural monuments, biosphere reserves and forest reserves that altogether provide an important base for the preservation of an invaluable natural system. The differences among them are still a matter of debate, and some comments will be made regarding this topic later in this research. Nevertheless, national parks and national monuments have been assigned with a higher value in the scale range, while forest reserves have been deemed with a lower one, since they allow the exploitation of nature for productive pruposes. Biosphere reserves stand in between.

Mapping the potential and the fragility of water

Preservation of Waterscapes
Low priority - High priority for preservation

FIG. 4.10 Conclusive map that shows the spatial distribution of the areas with the greatest potential, but also the greatest fragility, related to water. Source: made by the author.

The Venezuelan Guayana is rich in water resources. Most of its surface is part of the Orinoco River Basin -one of the largest rivers in South America-, with only minor areas draining into the Amazon River and the Essequibo River basins. In terms of discharge volume, the Orinoco is the fourth largest river in the world. It is navigable for most of its length, and it has direct access to the Atlantic Ocean throughout its wide delta. This attribute was considered fundamental by the team of planners of the Harvard-MIT Joint Center for Urban Studies during the 1960s, when they were working on the plan for Ciudad Guayana for the Venezuelan government. They gave a great value to the Orinoco River, since it allows the processing industries of the new town to easily reach the Atlantic Ocean and therefore the global market. This strength is still valid today. In fact, the Orinoco River allows CVG-Bauxilum to transport the bauxite ore that is extracted in Los Pijiguaos to the industrial area of Matanzas, located more than 300 kilometers away. For this reason, the navigable part of the Orinoco River was considered as an important asset in the assessment.

A wide number of tributaries feed the Orinoco River in this vast region. Along with the other rivers that flow into Guayana and Brazil, there are more than 80.000 linear kilometers of waterways in the Venezuelan Guayana. These rivers have an important recreational value, and for this reason their main courses were also used in this analysis. Other valuable features of scenic value, such as waterfalls, lakes and the Guri freshwater reservoir, were mapped and used as indicators. Most of the tributaries of the Orinoco River flow from the Guyana Highlands through a staircase terrace formation, creating these waterfalls but also rapids. As with the

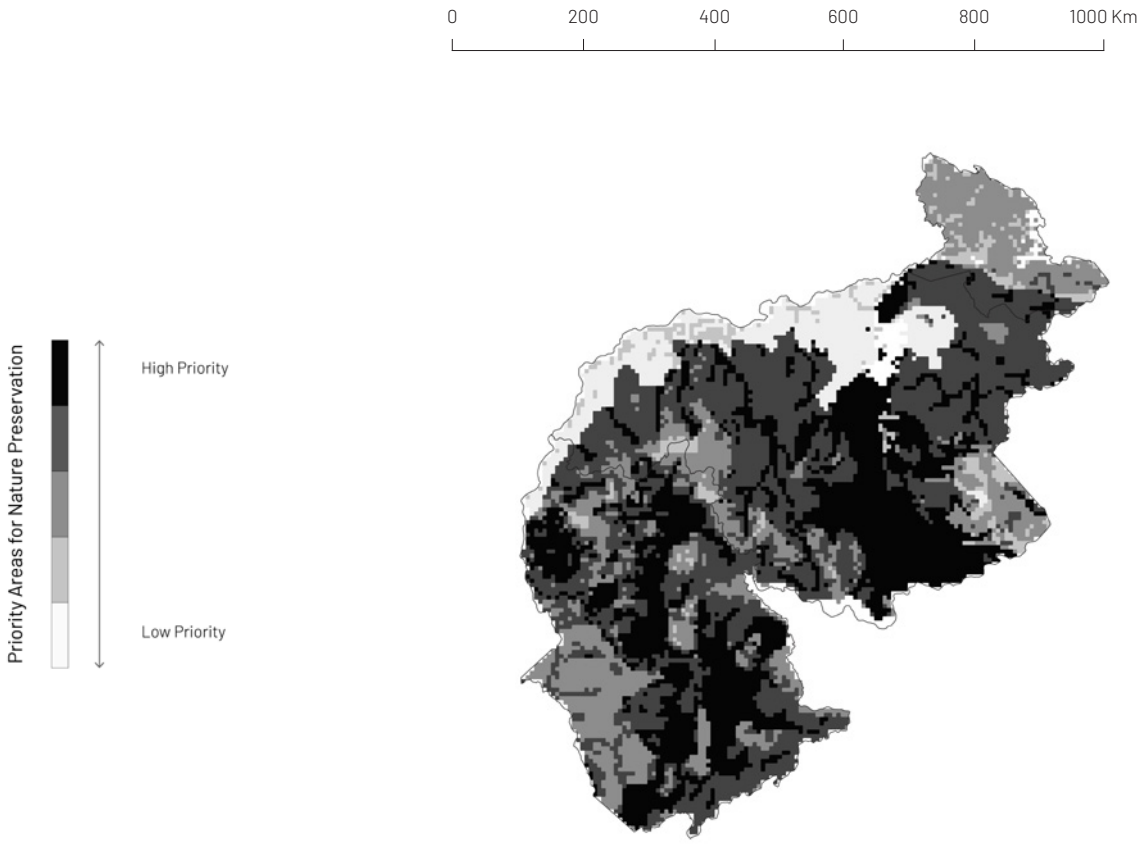


FIG. 4.11 Conclusive map that shows the spatial distribution of the areas with the greatest potential, but also the greatest fragility, related to the natural system as a whole. Source: made by the author.

system of Tepuis, most of these water bodies and waterfalls constitute a touristic attraction. Angel Falls in the Canaima National Park, with a plunge of more than 800 meters from the top of the Auyán-Tepui, is the highest uninterrupted waterfall in the world. Special consideration was also given to the vegetation that depends on the existence of a healthy water system. Riparian and gallery forests along water courses, the swamp moist forests of the Orinoco Delta, the floodable grasslands and savannas, together with the Orinoco wetlands and the coastal system of mangroves were visualized in space. All these ecosystems have a special value, and although they are part of broader ecoregions that have been previously assessed in the Vegetation sub-layer, they have a direct bond of dependence to the water system of the region. As such, they have been assessed once more in the Hydrology sub-layer.

Finally, the Caroní River Sub-Basin was considered in this part of the assessment. It is one of the major tributaries of the Orinoco River, and its waters are the main source of energy for almost all of Venezuela. A system of hydroelectric dams has been built along the Caroní since the 1950s, providing more than 70% of the energy that the country demands. But an important part of the illegal mining sites that exist in the Venezuelan Guayana are concentrated within the Caronì River basin and along the river itself. The erosion processes initiated by the extraction of gold, but especially by anarchich small-scale agriculture and livestock farming, may compromise the efficiency of the turbines in the dams. For this reason, the system of rivers inside the Caroní River Sub-Basin were considered extremely valuable. Their strategic importance goes far beyond the Venezuelan Guayana.

FIG. 4.12 Aerial view of Ciudad Guayana, the largest city of the region. It is an industrial new town that was planned and developed during the 1950s to diversify the national economy. In this image, the Caroní River flows into the Orinoco, close to one of the industrial ports used by the state-owned mining companies. Retrieved from http://aiesec.org.ve

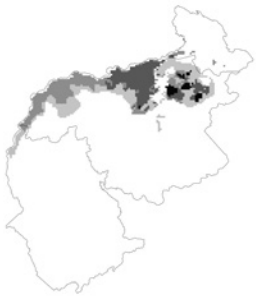
4.4 – **Human Occupation**

Mapping the potential for forestry and agriculture

Although it is the least populated region of the country and having seen that it is peripheral in nature -with the exception of the bigger urban centers of Ciudad Guayana and Ciudad Bolívar-, the Venezuelan Guayana remains as a region with great unleashed potential. The first democratic government of Venezuela in 1959, but also the team of planners of the Harvard-MIT Joint Center for Urban Studies saw an opportunity to diversify the national economy in this region. Their idea was closely related to import substitution industrialization by way of processing the nations natural resources, an idea very much framed in developmentalist thinking. The vision proved to be a successful one for more 40 years and created a productive industrial platform in Ciudad Guayana that provided stable employment for thousands of people. In an essay published in 2001 about the development of the new town of Ciudad Guayana, Tom Angotti noted that he impressed by the fact that in a country with high poverty rates like Venezuela, the social contrasts in that city were considerably lower.

Today, the situation is completely different. The state-owned industries have been destroyed by mismanagement and lack of investments (Prat, 2012), and the region's inhabitants -as the rest of the country- are impoverished and struggle to subsist. Dependence on resource extraction still prevails in the Venezuelan Guayana, but the type of extraction has shifted from a formal an industrial one towards an informal and illegal one that does not provide the same benefits. In a country that currently fights for a different future, an important question emerges: can we foster other (and more sustainable) forms of economy in this region to reduce the current dependence on resource extraction?

Potential for Forestry
Least potential - Most potential



Potential for Agriculture
Least potential - Most potential

Poles of Attraction
Low - High attraction capacity

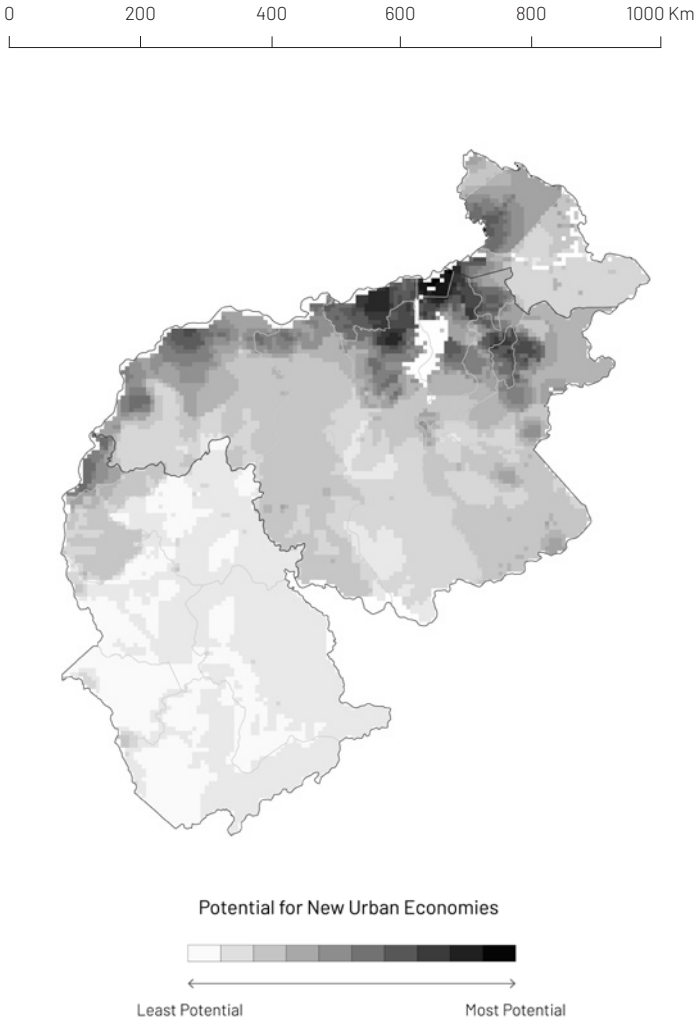


FIG. 4.13 Several indicators were used to visualize the spatial distribution of areas that may hold a greater potential for the development of other forms of economy. Source: made by author.

FIG. 4.14 Conclusion map that shows a very broad spatial distribution of the opportunities that may exist in the region for the development of new economic activities around urbanized areas. Source: made by the author.

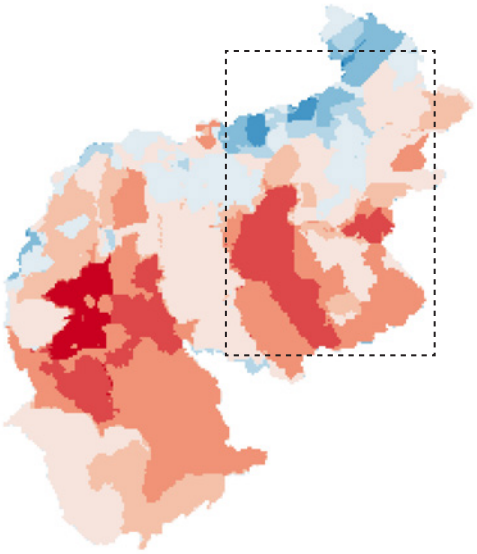
The research on local initiatives in the Venezuelan Guayana has shown that agroforestry and eco-tourism already have an important place in the region. Some of these initiatives create opportunities for local inhabitants, and an alternative to illegal mining. The search for suitable places for forestry and agroforestry was considered important, and for this reason the soil fertility capability classification was used as an indicator once again. As previously stated, almost all soils have low fertility in this region, so the value scale goes from extremely low fertility soils to relatively low fertility soils. But local initiatives such as PhyNatura have proven that sustainable agroforestry strategies can also make a natural protected forest a highly productive one, going beyond the traditional notion of preservation and productivity. Therefore, protected forest reserves were mapped and used as an indicator, along with the areas were productive forests already takes place. Agricultural lands in the plains along the Orinoco River, and areas where livestock raising have been traditionally embraced, have also been mapped and used as a spatial indicator. This information was then crossed with soil types according to their drainage capacity. Soils with excess water or extremely high levels of moisture were given low values in the scale range, along with dry sandy soils; while soils that have a more stable balance between dry and wet seasons were given a higher value.

Mapping the potential for industrialization

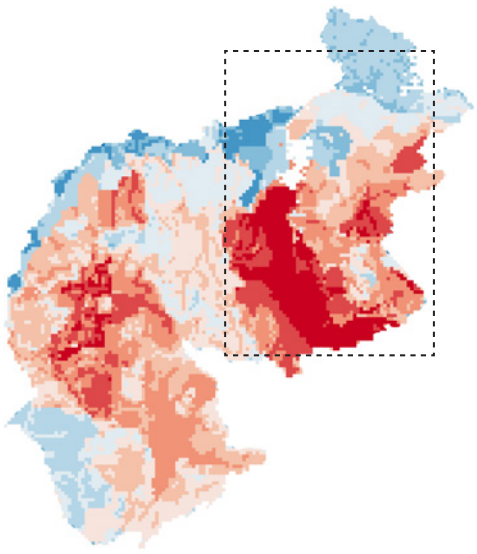
If we shift towards a future with a reduced dependence on resource extraction -or even within a scenario that bans mining, as was the case of Costa Rica and El Salvador-, the potential for industrial development remains very high in the Venezuelan Guayana. Ease of accessibility through the Orinoco and its delta to the Atlantic Ocean, abundance of water, and the capacity of the hydroelectric dams to provide the industries with cheap and clean energy, will always be there. The location of the dams along the Caroní River was used as an indicator, since proximity to them represents greater accessibility to energy for the potential new industries.

But industries need a working force, and they benefit from economies of agglomeration. In other words: industries tend to cluster around other industries and close to people. For this reason, industrial platforms were mapped and used as an indicator, along with population density, integration and accessibility (the conclusion of the first sub-layer). Finally, the system of cities, towns and villages of the Venezuelan Guayana was mapped with a gradient of buffers, which aims to abstract the magnitude of their regional attraction. A buffer of 60 km was given to cities (less than an hour by car), 30 km to towns (half an hour travel time by car), and 5 km to villages (half an hour walking-distance).

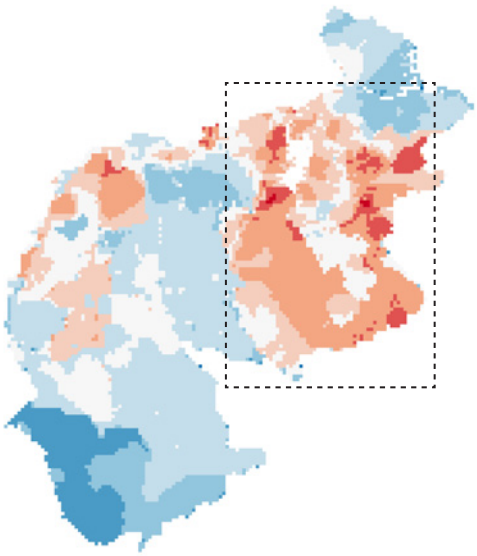
The final overlay represents the areas with greater potential for further urban growth, or for the development of other forms of economies that could benefit from their proximity to people and infrastructure. The result is similar to the conclusion of the Peripherality sub-layer, but with a finer grain. The potential for eco-tourism was not considered, since its indicators have already been used for the construction of the Nature sub-layer. The final overlays in the following chapter (for example, the crossing of the Nature and the Periphery sub-layers) will highlight which areas are more suitable -or strategic- for the development of an eco-tourism industry.



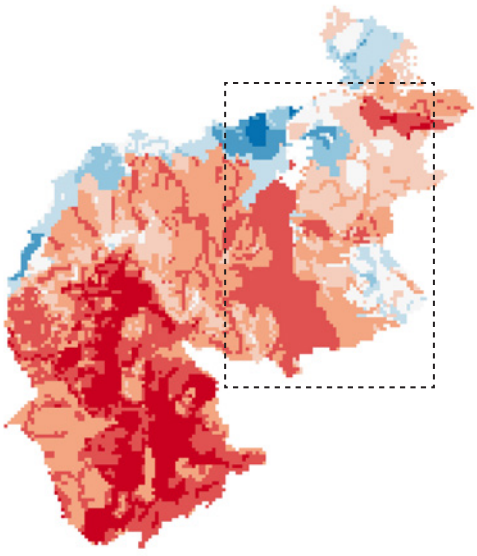
Extraction + Peripherality



Extraction + Preservation



Extraction + Urbanization



Preservation + Peripherality

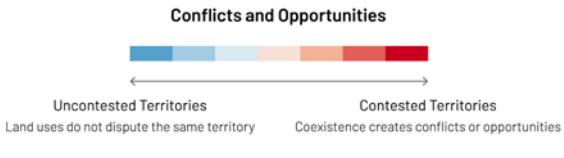


FIG. 4.15 The overlay of the four different conclusive maps highlighted areas of conflict within the region, but also places that offer interesting opportunities for other forms of development. Most of the extractive activities that are being carried out takes place in peripheral and remote areas, where the fragility of the natural system is extremely high. Therefore, the generation of alternatives for those communities must go hand in hand with the exploration of new notions of development and preservation. The challenge is to understand what opportunities can be created by taking advantage of the potential of the forest to support sustainable economies. Source: made by the author.

FIG. 4.16 The landscape of the Gran Sabana, inside the Canaima National Park in the State of Bolívar. Photograph taken by Flávio Varricchio. Retrieved from https://www.summitpost.org

4.5 – **Regional Conclusions**

Conflicts and opportunities in the Venezuelan Guayana

This systematic regional scale analysis, and the composite maps that resulted from overlaying all the cartographic material that was made for each theme, are to be understood as a heuristic research and design tool. Even though all data was retrieved from reliable sources, they have been interpreted and evaluated according to a scale of values defined by the author. The analysis will always be incomplete, since some layers of information were not used either by ignorance or by intentional omission. But rather than a failure in the act of describing the territory, this should be understood as an act of design. As Korzybski stated: the map is not the territory. But the methodology that was used and the conclusion maps that were produced by this regional scale analysis served a purpose: they allowed to have a better understanding of the spatial distribution of different problems, and helped to abstract the complexity of the region by categorizing it.

The overlay of the different conclusive maps that were produced highlighted areas of conflict in the region, but also many opportunities. For example, the superposition of Nature and Peripherality pointed out areas where strategies that facilitate the infrastructures that are needed by the ecotourism sector could make sense. These are areas of opportunities. But in the same way, the overlay of Extraction and Nature highlighted extremely valuable areas, from an ecological and scientific point of view, that are being endangered by the extractive economy. These are areas that need strategies of preservation and the restoration of the rule of law; but they are also interesting areas where other notions of development and preservation could be tested, and where alternative economies could be promoted.

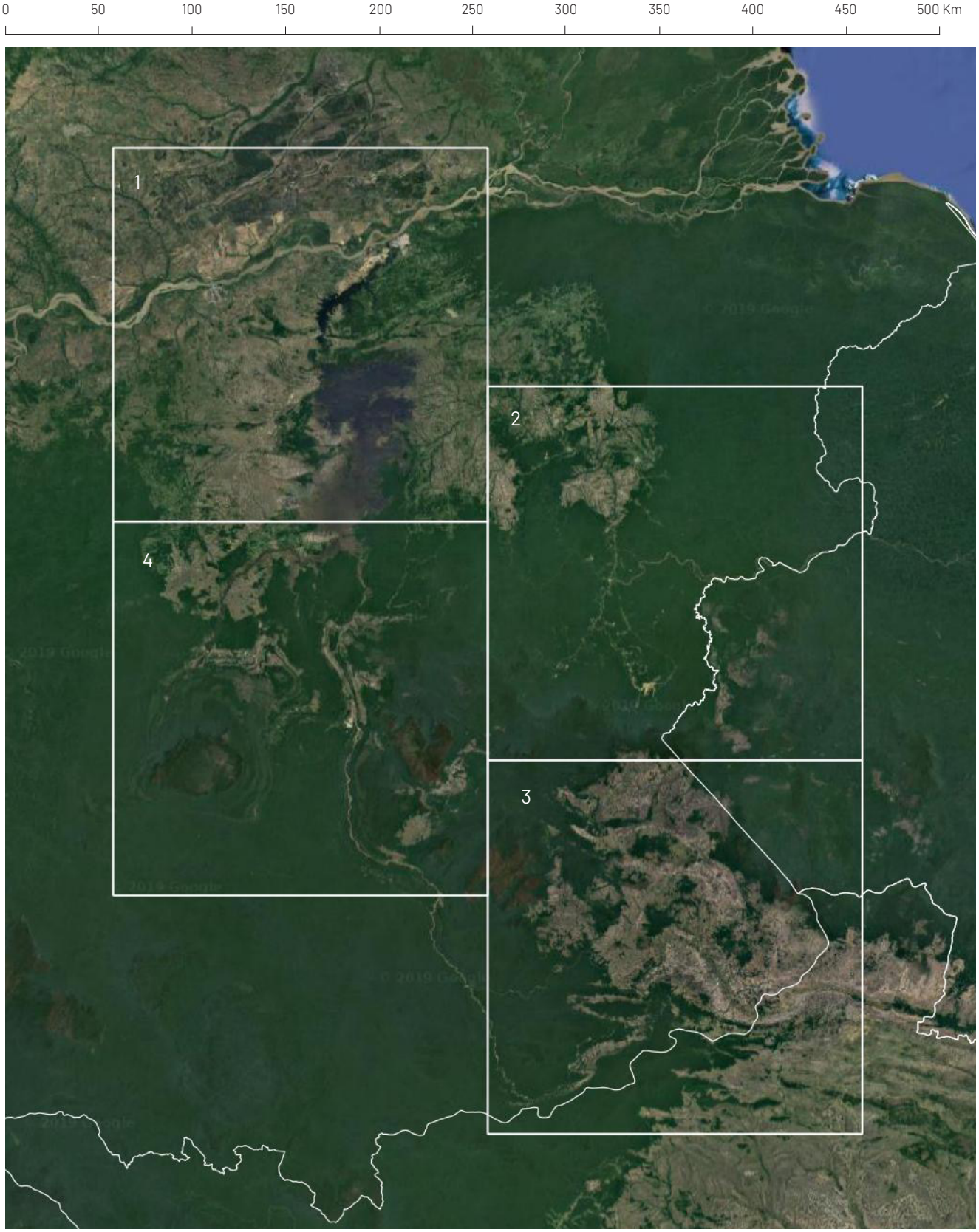
If a portion of the territory happens to be threatened by extraction, but in another conclusive map it is shown as a strategic area for the strengthening of the ecotourism sector, we can conclude that this methodology is useful for identifying conflicts and opportunities at the same time. In any case, this method proved to be extremely useful for the categorization of a vast mega-region, and in the identification of a series of srategic places where some interventions and demonstration projects culd be tested at another scale. Without this analysis, it would have been very difficult to apprehend the spatial dimension of the wide range of conflicts and opportunities this region has,;and the selection of some locations for the design testing explorations would have been fundamented only on the basis of subjective hunchs.

FIG. 4.17 Satellite image of a broad transect inside the Venezuelan Guayana, where the four different categories that were outlined after the regional scale analysis can be found. Source: Google Satellite, using QGIS.

As mentioned above, this systematic method allowed to simplify the problem and to subdivide the region into broad categories. Indeed, different problems could be recognized in four different areas that can be found all over the Venezuelan Guayana: accessible and well integrated urban areas along the Orinoco River; peripheral areas with low densities, but with some accessibility to basic services; remote areas in ther borderland with very low densities, but that can be reached by road nevertheless; and extremely remote areas that are almost inhabited and that can only be reached by boat or with small planes, but with a tremendous potential for ecotourism. Recommendations for certain policies and strategies can already be made for each one of these broad categories, but the exploration must go on at a smaller scale if we want to have a better understanding of the possibilities and limitations of the territory. A transect where the four categories could be found was identified, but only one of those frames will be tested in this research. Within the transect, the four selected areas can be described as follows:

1. The first category focuses on the most integrated area of the Venezuelan Guayana, and with the highest accessibility to people and basic services. It is also the area with the greatest potential for urban development and industrialization. Ciudad Guayana and Ciudad Bolívar, the most populated cities of the region, are located within this zoom. But also, the peri-urban and mid-sized city of Upata, and the industrial town of Ciudad Piar at the foot of the iron ore extraction site of Cerro Bolívar. The Guri reservoir and the system of hydroelectric dams along the Caroní River, the proximity to the navigable Orinoco River, and relatively high population densities make this area an interesting frame to better understand the potential of this region.

2. A series of peripheral towns along the trunk road that connects Venezuela with Brazil have had a long gold mining tradition since the XIX Century. Guasipati, El Callao and Tumeremo, but especially El Dorado and Las Claritas, are the gold extraction hotspots of the region. Here, the environmental, social and economic byproducts of the extractive economy are strongly felt, and the area is in a fragile environment of tropical moist forests that need especial consideration. Even though many of the settlements that can be found within this frame have access to some basic services, their quality is very low. When specialized services are needed, people need to travel to the larger cities of the nort. This zoom could be interesting to explore strategies that may help reach a critical mass, where conditions for other forms of economy might be facilitated, and where endogenous development could be promoted.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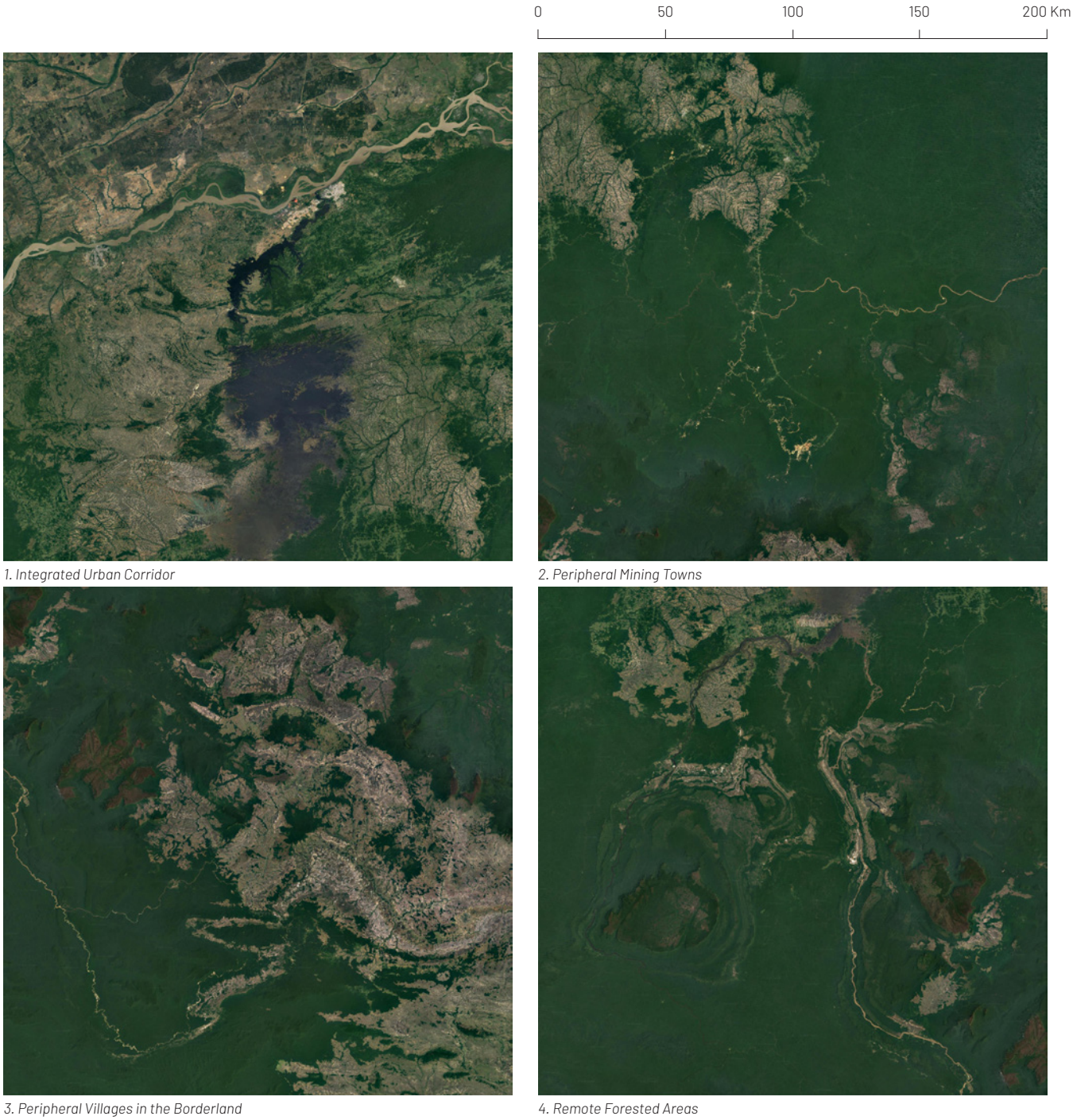

1. Integrated Urban Corridor

2. Peripheral Mining Towns

3. Peripheral Villages in the Borderland

4. Remote Forested Areas

FIG. 4.18 The most integrated areas with the highest accessibility to poeple and basic services can be found in the urban corridor along the Orinoco River. Ciudad Guayana and Ciudad Bolívar, the biggest and most populated cities of the region, but also Upata and Ciudad Piar, are located inside this frame [1].

A series of peripheral towns along the regional trunk road that connects Venezuela with Brazil have a long gold mining tradition since the nineteenth Century. Guasipati, El Callao and Tumeremo, but especially El Dorado and Las Claritas, are the gold extraction hotspots of the Venezuelan Guayana [2].

To the south, a series of peripheral villages in the borderland with Brazil can be accessed with a few roads, but lack accessibility to most basic services. Only the town of Santa Elena de Uairén can satisfy some of those needs, but distances are great between settlements [3].

There are vast natural protected areas that can only be accessed with boats or small planes. Small villages and settlements can be found within them, mostly inhabited by indigenous groups. Some of them are willingly and heavily engaged in resource extraction, like the communities in the Canaima National Park [4].

3. The Gran Sabana is a remote area with great touristic potential, surrounded by features of unique scientific value. The greatest concentration of tepuis and waterfalls is in this part of the Guayana Highlands, and it is already enjoyed by thousands of people that come from all parts of the world. Compared to other parts of the region that also have an important ecological value, this area has access to some basic services, can be reached by road and not only by plane, and has a direct connection to Brazil through the regional trunk road. Illegal small-scale gold mining is present here, but there is also an important number of local initiatives that seek to provide an alternative to mining. This is an interesting area to explore to promote endogenous development in remote areas with great ecological value.

4. The Canaima National Park is an extremely remote area with unique features of scenic and scientific value, such as the Auyán-Tepui, the Angel Falls, or the Canaima Lagoon with its system of waterfalls. Illegal small-scale gold mining is threatening the entire ecosystem of this natural protected area; and many of those mines are operated by indigenous communities, willingly and without coercion. In fact, this frame lies within what some scholars call the 'Indigenous Mining Arc'. In terms of accessibility, this part of the Venezuelan Guayana can only be reached by plane or boat. It has no access to services, other than those offered by ecotourism. In addition, it is scarcely inhabited. This is an interesting frame to explore strategies that may provide an alternative to mining in extremely remote areas, where preservation is fundamental and where indigenous communities are lacking opportunities.

5 – Why Not Invest in the Periphery?

Understanding the potential for endogenous development

FIG. 5.1 The borderland village of Icabarú, with little more than 2,500 inhabitants and 120 kilometers away from Santa Elena de Uairén. Virtually all of the community is engaged in illegal small-scale diamond and gold mining in one way or another. Photograph taken by Morelia Morillo. Retrieved from http://lascronicasdelafrontera.blogspot.com

FIG. 5.2 The Albino Mine, near the town of Las Claritas, in May 2016. With the economic crisis, thousands are streaming into the mines of the Venezuelan Guayana. Photograph taken by Meredith Kohut for the New York Times. Retrieved from https://www.nytimes.com

There are regions in which strategies, policies and interventions in peripheral areas becomes necessary, such as the case of the Venezuelan Guayana. Here, if nothing is done, the extractive path that prevails today will inevitably leave a vast patchwork of dead land and water behind that will be very difficult to remediate, paired with profound social impacts that will last for many generations. It could be argued that investing energy and resources in so many places with so little inhabitants is a questionable strategy, especially if larger urbanized areas hold a greater potential for economic development. But if we give the Venezuelan Amazon a value because of the richness of its biodiversity (Hoorn et al., 2010), the importance of the environmental services it provides at a global scale (Dourojeanni, 1999), and because of its fundamental role in the production of water and energy for the Venezuelan population (González Rivas, Malaver & Naveda Sosa, 2015), then we must do what is in our hands to preserve such a unique place in the world. Alternatives and new opportunities in these peripheral areas may reduce the current dependence on resource extraction and prevent further environmental degradation. The challenge is to find ways in which the carrying capacity of the Amazon forest can become an important source of employment for those communities, going beyond the traditional notion of preservation that still prevails in Venezuela.

The investigation of local initiatives in the region, evidenced that there are extremely interesting examples in the region that make a sustainable use of the potential that is present in the territory, outlining an alternative path for the future. The challenge lies in understanding which are the necessary conditions that need to be facilitated to multiply this type of initiatives, so as to trigger a virtuous cycle of productivity and self-reliance. The development of a strong ecotourism sector, the sustainable management of the forests for the commercialization of non-timber products with high market value, the processing of those products and the creation of added value with specialized manufacturing industries, are only but some examples of alternative economies that could foster local sustainable development in peripheral and remote areas throughout the region. The diffusion of technology, innovation and knowledge becomes an essential requirement to facilitate the transformation of the production system in the region, and the first step to shift away from the current state of extreme dependency on resource extraction. In this chapter of the report, some of the regional challenges for a sustainable future will be explored. Then, the theory of endogenous development will be presented, followed by a brief characterization of the natural and cultural resources that exist in this region, since they are at the base of local sustainable development. Next, the territorial dimension and some spatial considerations will be outlined to operationalize the theory. And finally, some aspects of this type of development, such as the need of a new governance structure and the creation of networks at multiple levels, will be highlighted to provide a framework for the implementation of a regional strategy.

FIG. 5.3 An artisanal gold miner working in the waters of the Yuruarí River, near the Nacupay sector of El Callao. Equipped with very simple and portable instruments, artisanal miners directly extract gold and diamonds from the alluvial placers of the region with rudimentary techniques. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

FIG. 5.4 To work for Minerven, the state-owned gold mining company based in El Callao, used to provide social status among locals. But the industrial production plants have been dismantled and the yearly production targets are not met (Ebus, 2018). Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

FIG. 5.5 According to Bram Ebus, it is common to have a few processing mills in the backyards of many houses, close to various holes in the ground (2018). Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

FIG. 5.6 In El Callao, mines become villages and villages slowly become mines. Almost all of the gold that is being extracted in the region is controlled by organized criminals and paramilitary groups. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

5.1 – **Regional Challenges for a Sustainable Future**

Inaccessibility and lack of opportunities in the Venezuelan Guayana

The large-scale mining project of the Orinoco Mining Arc set out by the national government, together with the uncontrolled rise of illegal gold mining throughout the region, with more than 300,000 artisanal miners working in extreme conditions and under the rule of organized criminal networks and paramilitary groups (International Crisis Group, 2018), help to depict two sides of the same coin: an extractive mindset that is profoundly fixed in Venezuelan society. In addition, the line that separates legal from illegal extraction has been blurred with the decree of the Orinoco Mining Arc in 2016, since it created a legal framework for the illegal mining operations that are taking place within its boundaries. According to Bram Ebus, a Dutch journalist and Pulitzer grantee, an official from the state-owned mining company Minerven, based in El Callao, admitted that the firm buys gold directly from illegal mining projects run by criminal groups (Ebus, 2018; International Crisis Group, 2019). In other words, the national government stimulates illegal activities in order to augment the gold reserves of the Central Bank in Caracas.

It is clear that the cost of getting hold of important profits in the short-term is simply too big to be left unquestioned, especially if evaluated in the long-term. Therefore, the creation of alternative economies to reduce the current dependence on resource extraction should be a priority for the region, especially if we give a value to the fragile and biodiversity-rich forests of the Venezuelan Amazon. Large and medium-sized urban areas that enjoy the benefits of agglomeration economies can be found in the northern parts of the region and along the Orinoco River. This is the case of centres like Ciudad Guayana, Ciudad Bolívar and Puerto Ayacucho, but also Upata and Caicara del Orinoco. Nevertheless, the vastness and inaccessibility of the

‘If you behave well nothing will happen to you. If not, you will end up into the hills and they will turn on the chainsaw’

[Juan, gold miner • El Callao, Bolívar]

Stories of Violence

Juan works in one the many mines that surround El Callao. There he makes more money in one day than he could earn in a month in the formal economy, but he is also taking more risks. He needs to pay a mandatory extortion fee, better known as a ‘vaccine’, to the criminal group that controls the mine where he works. And the consequences of not paying that ‘vaccine’ can be dreadful. The massacre of Tumeremo, in which 28 miners were murdered in 2016, is till engraved in everybody’s memory. And according to Bram Ebus, horror stories about mass graves and dismembered bodies are very common in mining areas of the Venezuelan Guayana. In El Callao, gangs are known to come down from the surrounding hills during the evening, disappearing with people that didn’t behave (Ebus, 2018).

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes. Some of the photographs that accompany the microstories come from the same source, but this was not possible in all cases. The idea is to give a picture of how people live in peripheral and remote areas of the Venezuelan Guayana.

Ebus, B. (2018, January 15). *Digging into the Mining Arc. The destruction of 110 thousand square kilometres of forests in the largest mining project in Venezuela.* Retrieved from https://arcominero.infoamazonia.org/

FIG. 5.7 A worker in one of the many illegal gold mines of the region. Photograph taken by Manu Quintero. Retrieved from https://www.bbc.com

‘Death presents itself because people live so far away. First, they need to cross a river, then wait for a boat, then for a mule and then a Toyota jeep needs to transport them to us. This can take up to three or four days.’

[Luis, local medic • Tumeremo, Bolívar]

Stories of Peripherality

Luis works in the only research center that is equipped to diagnose malaria in Tumeremo and several kilometres around. He sees between 60 and 80 patients every day, mostly gold miners. They come from Upata, El Manteco, Guasipati, El Callao, El Dorado, Kilómetro 88, the mines of Bochinche, and even from neighbouring Guyana. He comments that many patients come too late to the diagnostic center. Sometimes because distances are long their health situation gets complicated during the journey; others because they don’t want to travel before obtaining the gold they extracted from the processing mill. ‘Those end up losing the gold but also their lives’, he says. Luis has had malaria 13 times himself, and to earn extra cash, he also works in the mines from time to time.

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes.

Ebus, B. (2018, January 15). *Digging into the Mining Arc. The destruction of 110 thousand square kilometres of forests in the largest mining project in Venezuela.*

PAHO/WHO Venezuela. (2017, May). Héroes de la salud: César Fuenmayor, microscopista del “Centro Vitanza”, Tumeremo. Salud Hoy Digital Bulletin, 3. Retrieved from https://www.paho.org/

FIG. 5.8 Ana María Padrón with her two sons, who were fighting malaria. Photograph taken by Meridith Kohut. Retrieved from https://www.nytimes.com

FIG. 5.9 Hundreds of people with symptoms of malaria, overflowing a clinic in Ciudad Guayana to get medical treatment, in May 2016. Photograph taken by Meredith Kohut for the New York Times. Retrieved from https://www.nytimes.com

FIG. 5.10 According to Bram Ebus (2018), around 200 people are tested for malaria in Puerto Ayacucho every day, and half of them usually test positive. Local doctors demand more testing facilities and medicine handouts, especially in remote areas. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

FIG. 5.11 A mother and her 23-year-old son, who works as an illegal gold miner. He has been infected with malaria for 21 days, and trembles while waiting to be examined. Photograph taken by Meredith Kohut for the New York Times. Retrieved from https://www.nytimes.com

Venezuelan Guayana makes it very difficult for the inhabitants of peripheral towns and villages to benefit from the opportunities offered by larger urbanized centres. The lack of opportunities is paired with a general shortage of quality services in those areas, a fact that may be explained by the absence of a critical mass to justify those investments. Altogether, this situation creates great difficulties for the people that live in peripheral and remote settlements. Depending on the location of some of these villages, journeys to the closest health facility may take up from four to ten days, a time lapse in which a person's medical situation can get complicated (Ebus, 2018), especially if we consider the outbreak of malaria that currently whips the region. In his report on the Orinoco Mining Arc, Bram Ebus managed to interview a local medic in the State of Bolívar, and he affirmed that many times 'death presents itself because people live so far away' (Ebus, 2018).

This situation becomes even more dramatic for the 23 different indigenous groups that live in the Venezuelan Guayana. Only few of those groups -like the Hoti and Yanomami peoples- live in voluntary isolation and have little contact with urbanized areas. All the other have experienced some degree of transculturation since the arrival of Europeans in the XV Century, which makes them rely on the market economy to access some basic goods and services. However, most of these groups live in peripheral and remote areas with great problems of accessibility. César Fuenmayor, a microscopist that works in a diagnostic center in Tumeremo, says that Kariña indigenous peoples infected with malaria come often from very far away, infected with malaria, after walking for several hours with a strong fever because they don't have access to public transportation (PAHO/WHO, 2017). This is merely one example that illustrates how indigenous groups rely on some of the services provided by the towns and villages of the region, and the limitations posed by inaccessibility in their well-being.

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FIG. 5.12 More than 4,150 square kilometers of forests have been lost in the region from 200 to 2013, and illegal gold mining is responisble for an important part of that area. The photographs, taken by Miguel García Moya, are part of a series entitled 'Back to the Abyss'. Retrieved from http://miguelgarciamoya.blogspot.com

According to Marc Dourojeanni (1999), poverty and lack of social improvement opportunities are at the root of deforestation in Latin America, and he argues that it has been that way for more than 50 years. Indeed, small-scale farmers and gold miners are trying to find a way to subsist by exploiting natural resources, especially in remote and peripheral areas that offer little alternatives to neglected communities. In the Venezuelan Guayana, the main causes of deforestation have traditionally been anarchich agriculture and livestock farming, but also logging, urbanization and mining (Lozada, 2007, 2018; Lozada & Carrero, 2017; RAISG, 2015; Oliveira-Miranda & Morón-Zambrano, 2018). Between 1960 and 2000, approximately 8,900 square kilometers of tropical moist forests were lost human activity south of the Orinoco River. But from 2000 to 2013 the rates of deforestation in the region experienced an astronomical rise, accounting for the loss of more than 4,150 square kilometers of fragile woodlands (Oliveira-Miranda & Morón-Zambrano, 2018). The surface of Amazon rainforest that was lost over those thirteen years accounts to almost half of the total surface that was deforested in the previous four decades. Although agriculture and livestock farming continue to be the most important causes of deforestation in the Venezuelan Guayana (Lozada & Carrero, 2017), a report on deforestation in the Amazon indicates that illegal mining has recently emerged as one of major causes of deforestation in Venezuela (RAISG, 2015). The rise of illegal small-scale gold mining is an ongoing trend, and today Venezuela ranks among the countries with the highest deforestation rates worldwide (Lozada, 2007).

PROTECTED NATURAL AREAS OF THE VENEZUELAN GUAYANA (Provita, 2018)

TYPE OF AREAS	NUMBER OF AREAS	SURFACE AREA (Km^2)
National Parks	6	171,977.39
Natural Monuments	19	66,213.74
Biosphere Reserves	2	90,997.39
Forest Reserves	3	59,545.01
Official Totals	30	392,079.65
Overlaps		118,773.12
Real Totals		273,306.53

An important part of the illegal mining operations is taking place in legally protected areas, created by the state for the protection, preservation and conservation of ecosystems and landscapes with unique ecological value. Indeed, the illegal gold mining hotspots of the region today are located inside the Imataca Forest Reserve and the Canaima National Park, both in the State of Bolívar; a situation that compromises the efforts made over the last 80 years for the safeguarding of large and valuable areas. Venezuela is among the countries with the largest surface of protected natural areas in the world, and the Venezuelan Guayana accounts for most of that protected land. There are 30 different areas under special regimes of administration in the region, within four categories with differences among them in terms of land use regulations and conservation goals. According to GIS data provided by Provita, a Venezuelan environmental NGO, the wide array of protected natural areas that exist in the Venezuelan Guayana add up to more than 390,000 square kilometers (Provita, 2018). However, the same NGO and a number of scholars warn that this number does not reflect the reality, since 30% of these areas overlap in some way (González Rivas et al., 2015).

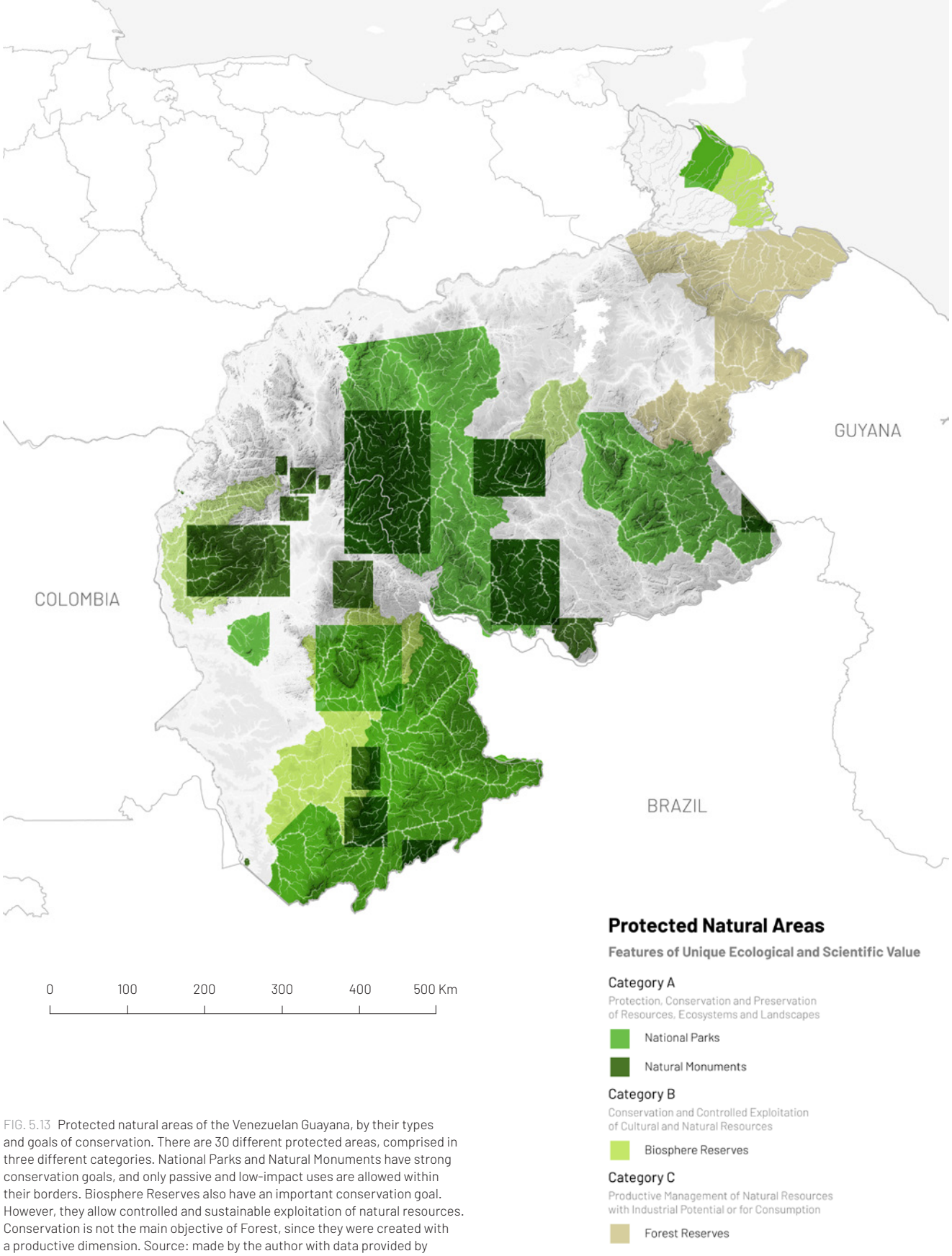

FIG. 5.13 Protected natural areas of the Venezuelan Guayana, by their types and goals of conservation. There are 30 different protected areas, comprised in three different categories. National Parks and Natural Monuments have strong conservation goals, and only passive and low-impact uses are allowed within their borders. Biosphere Reserves also have an important conservation goal. However, they allow controlled and sustainable exploitation of natural resources. Conservation is not the main objective of Forest, since they were created with a productive dimension. Source: made by the author with data provided by Provita; Open Street Maps; USGS; and IGVSB.

FIG. 5.14 The Pará Falls, located in the recently created Caura Natural Park, are the second largest waterfalls in the world by width. Retrieved from https://www.lagransabana.travel

FIG. 5.15 The 'Mountain of the Mist', a sandstone massif in the Serranía de la Neblina National Park. It is located in the northern part of the Amazon River basin, along the border with Brazil. Retrieved from https://www.brasilturismo.com

FIG. 5.16 The Chimantá-tepui, one the many tepuis that form the Chimantá Massif, located inside the Canaima National Park. Photograph taken by Antonio Hitcher. Retrieved from https://twitter.com/escudoguayanes

Still, the surface of protected land is extremely large, and a crucial factor that made this bulk of protected areas possible was the existence of a wealthy petrostate founded on a rentier economic model. As stated by González Rivas, Malaver and Naveda Sosa, the lack of austerity in the use of the financial resources prompted the national government to opt for normative models of rigorous preservation without considering the possibility of a sustainable management model with a productive dimension (2015). Today, the enormity of the protected areas, the centralized structure of the organizations responsible for their management, the restrictive model behind their conceptualization, along with other factors such as rampant corruption, inadequate economic policies and the fall of oil prices in the global market, can be outlined as factors that hamper an efficient administration of these areas. In a nutshell, Venezuela may have hundreds of thousands of square kilometers of protected natural areas, but in practice it has great difficulties to take care of them. The risk is that the large array of national parks, natural monuments, biosphere reserves and forest reserves that exist in the Venezuelan Guayana become nothing more than 'paper parks', a term coined by Machlis and Tichnell in 1985 'to describe protected areas that exist as a government document and not as a functioning entity' (Dourojeanni, 1999, p. 14). If the uncontrolled gold rush that is taking place in the region today remains unchanged, the resulting loss of biodiversity and the patchwork of dead land and water that will be left behind will be dramatic.

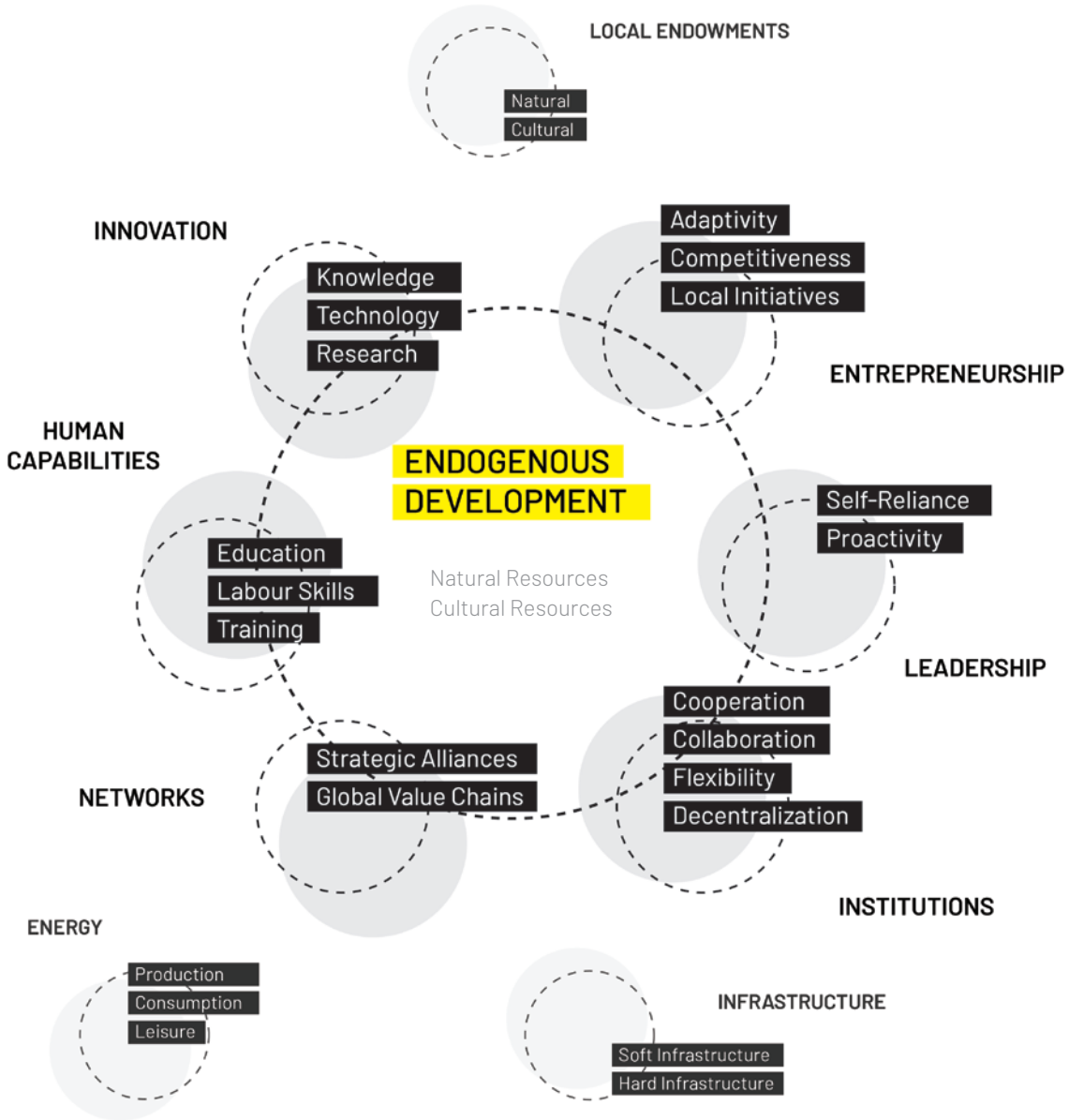

FIG. 5.17 Diagram that shows the main factors that play a role in endogenous development. According to Stimson & Stough (2008), innovation, human capabilities, leadership, entrepeneurship, institutional capacity, and the capacity of stakeholders to work in network strcutures are the preconditions that fcailitate the growth of local initiatives. Only then actors can really make the most of the natural and cultural resources available in the territory. Other authors mention that spatial factors, such as infrastructure and energy production, also play a crucial role (Vázquez-Barquero & Rodríguez-Cohard, 2017). Source: made by the author.

5.2 – **Endogenous Growth and Local Sustainable Development**

Local initiatives, networks, and the [new] role of the global market

Measures need to be taken locally in peripheral and remote areas, so as to provide economic alternatives to the region's inhabitants and reduce their current dependence on resource extraction. Local sustainable development minimizes the exposure of the region to external pressures, such as the uncertain fluctuations of commodity prices in the global market, while improving the living conditions of local communities in the long-run from an environmental, social and economic point of view. This shift from a vicious extractive cycle that mainly responds to factors and at the expense of the environment, towards a virtuous and self-sufficient one based on the sustainable use of the natural and cultural resources of the region, can be easily linked to the theory on endogenous growth that emerged in the 1980s (Romer, 1994).

Stimson & Stough (2008):

- Technology, Innovation and Knowledge
- Human Capabilities and Skills
- Leadership
- Entrepeneurship
- Institutional Capacity
- Network Structures and Strategic Alliances

Vázquez-Barquero & Rodríguez-Cohard (2017):

- Entrepeneurship, Clusters and Networks
- Innovation and Human Resources
- Institutions, Social Capital and Governance
- Natural and Cultural Resources
- Infrastructure and Urban Development
- Energy for Production and Consumption

Endogenous growth theory holds that endogenous or local factors play a very significant role in economic growth, while still recognizing that development is framed by exogenous or external factors (Stimson & Stough, 2008). From a territorial perspective, endogenous development models can be associated to the capacity of local communities to respond to global challenges by making use of the potential that is present in their territory, improving human conditions, increasing the level of employment and alleviating poverty (Vázquez Barquero, 2007; Vázquez-Barquero & Rodríguez-Cohard, 2017). Human capital, innovation and knowledge are at the core of this model, which emphasizes the role of local initiatives as an instrument of transformation. According to Vázquez-Barquero and Rodríguez Cohard, 'local initiatives are, sometimes, trying to offset the local forces of development, but also they are using external resources for making the most of local products, and for firms to be competitive in a global world' (2017, p. 2). Indeed, the success of this development model depends on the competitiveness of local initiatives and their capacity to weave networks at multiple levels, working with global value chains and taking part of the international market. Precisely for this reason, endogenous growth theory holds that strategies and policies should seek to facilitate the conditions for building local capacities and making local initiatives grow (Stimson & Stough, 2008).

In a region that is almost entirely covered by large extensions of tropical moist forests, it becomes fundamental to explore the full potential of that natural asset to create alternative and sustainable economies for local communities. As Santiago del Hierro and Gary Leggett have stated (2010), 'the question is therefore not whether the rainforest should be preserved or developed, but whether we can imagine and produce the conditions under which both are made possible and practicable'. The case of PhyNatura, briefly described in a previous chapter of this report and unquestionably one of the most successful local initiatives of the Venezuelan Guayana, can be used as an example to illustrate this point. Weaving networks at multiple levels PhyNatura has created a profitable model for local development that is making a sustainable use of the forest by harvesting non-timber products with high market value. This local initiative has gone beyond primitive and passive notions of preservation, integrating a productive dimension and creating a path for a sustainable future.

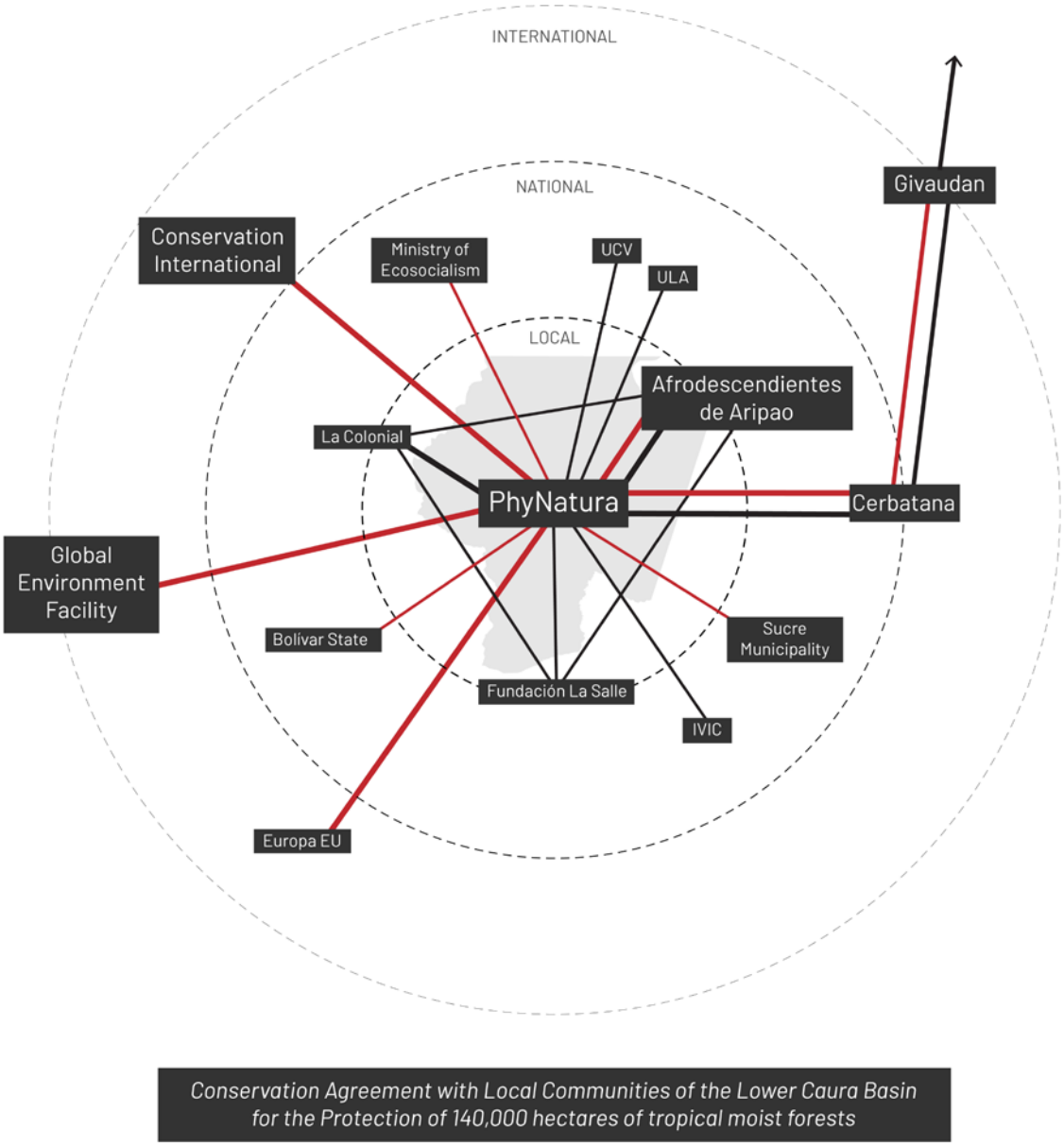

FIG. 5.18 Diagram that illustrates the network created by PhyNatura, with actors from all levels and sectors, to support the harvesting of tonka beans and copaiba oil in the lower Caura River basin. The initiative receives external funding, using a financial mechanism that pays for the ecological services provided by the forest, and with these resources PhyNatura engages with local civil society organizations for the collection of the non-timber forest products. The initiative has reduced the dependency of local communities in resource extraction, while preserving the forest. Source: made by the author, with information provided by Luis Jiménez Puyosa and PhyNatura.

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FIG. 5.19 A member of PhyNatura, giving technical support to the local civil society organizations in charge of protecting the forest and harvesting the forest products. Source: courtesy of PhyNatura.

FIG. 5.20 The fruit of the Sarrapia Tree contains the precious Tonka bean, referred to as 'black gold' by local farmers of the Caura River basin. Retrieved from https://www.conservation.org

FIG. 5.21 Tonka beans are then sold through a national intermediary to Givaudan, a large Swiss manufacturer of fragrances, flavors and cosmetics. Retrieved from https://www.conservation.org

The network involves a wide range of actors from all levels and sectors. First, a conservation agreement is signed with international agencies like Conservation International and Global Environment Facility, which provide PhyNatura with external funding. Locally, a strategic alliance is created with two civil society organizations of the lower Caura basin, formed by a group of Ye'kuana indigenous peoples and an by important community of afro-descendants. These local actors are in charge of harvesting the non-timber forest products, but also of protecting the biodiversity of the area that has been agreed upon with self-organized conservation committees. Two universities and a couple of research institutes, one of them with constant presence in the area, cooperate with studies on vegetation and socioeconomic dynamics, but also with data processing and wildlife monitoring. The public sector is constantly updated with the progress of the agreement and directly supports the initiative only at the municipal level, by promoting local activities of environmental education. Finally, once the forest products are harvested and ready to be sold, a national private company that trades with non-timber forest products acts as an intermediary between PhyNatura and Givaudan, a large Swiss manufacturer that makes use of them for further processing (Jiménez Puyosa, 2017).

It is the network that has been weaved and the agreements that have been made, both formally and informally, what has allowed PhyNatura to protect more than 140,000 hectares of tropical moist forests from the threats posed by mining, logging and poaching, while making a sustainable use of its non-timber forest products with sustainable agroforestry techniques. Such an initiative has allowed a number of local communities of the Venezuelan Guayana to participate in global economic processes, creating new jobs that have improved their quality of life and reduced their dependence on illegal activities that brought violence, diseases and the degradation of the natural system. In a nutshell, the entrepreneurial capacity of local actors has reversed the existing trends in this part of region, transforming the force of the global market into an ally and creating an alternative development path.

As mentioned above, the theory on endogenous growth holds that the diffusion of technology, innovation and knowledge is a fundamental condition to stimulate competitiveness and to facilitate local initiatives. Undoubtedly, PhyNatura represents an outstanding example of how local entrepreneurship can trigger a self-sufficient process of transformation, but there are also important opportunities for local development beyond forest management. The harvesting of non-timber forest products could be seen as a sustainable form of extraction that makes a responsible use of renewable natural resources. But as in mining, there is always more money to be made in processing than in extraction (Butler, 2018). Taking from the concept of forward and backward linkages developed by renowned economist Albert O. Hirschman (Watkins, 2018), investments should be encouraged in previous and subsequent stages of a particular production process. Forward linkages add value with further processing downstream; backward linkages add value by stimulating the manufacturing and provision of goods required by that production process; and sideway linkages can also be developed by promoting human resource development, knowledge acquisition, and by attracting specialized services to the region (Butler, 2018; Watkins, 2018). This economic concept opens new windows of opportunity for the industrialization of some peripheral areas of the Venezuelan Guayana, especially in large towns and small cities with comparatively higher densities, diversifying the possibilities for local sustainable development throughout the region.

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FIG. 5.22 The natural and cultural diversity of the Venezuelan Guayana has enormous proportions, and could become an important driver for endogenous development in remote and peripheral areas.It encompasses a large number of geographical features with unique scientific value, such as the Kukenán-tepui (1), that date from the Precambrian. And some of the largest waterfalls by width and height in the world, like the Pará or the Angels Falls, can also be found in this region. To the top right, an image of Jaspe Creek (2), a popular destination of the Gran Sabana.

But the diversity of the region is also cultural. There are more than 23 different indigenous groups spread throughout the territory, with valuable and different ways of livng that contrast with the traditional anthropocentric worldview. The Yanomami live in the southern areas of the State of Amazonas, but some groups also live in the south-east of the State of Bolívar (3, 4). Photographs taken by Paolo Costa Baldi (1), unknown author (2), AP (3), and Fiona Watson (4). Retrieved from https://upload.wikimedia.org (1); http://www.mintur.gob.ve (2); https://mg.co.za (3); https://www.survivalinternational.org (4).

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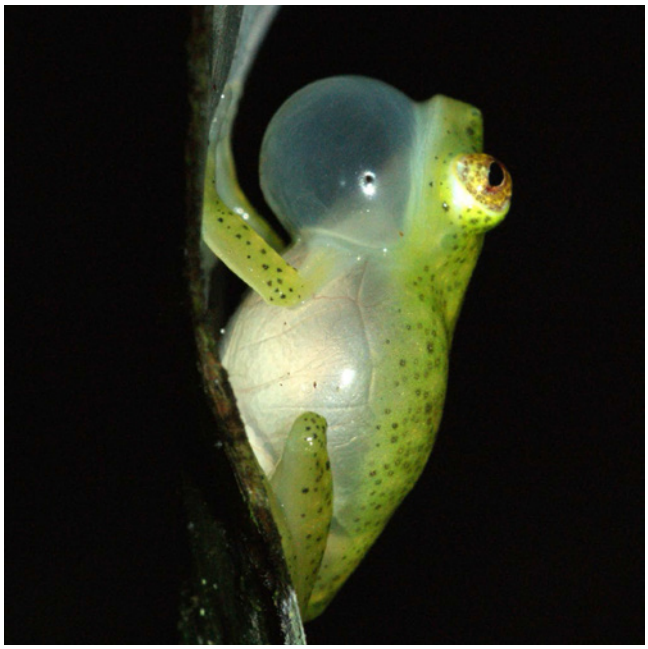

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FIG. 5.23 The richness of the region's biodiversity makes Venezuela one of the 10 most mega-diverse countries in the world. According to Rivas, Madi, Stachowicz & Isasi-Catalá, this region has the fourth largest concentration of amphibian species in the world, the sixth for birds, the eight for mammals, and the ninth for reptiles (Fernández et al., 2018). There are also more than 10,000 plant species spreaded in diverse ecosystems, from the rich tropical moist forests of the Amazon (5) to the unique pan-tepui ecoregion of the Guayanan Highlands (6). To the bottom-left, an image of a glass frog (7). And in the bottom-right, a Venezuelan red howler, a species of howler monkey (8). Photographs taken by Alberto Blanco (5), Gustavo Moser (6), César Barrio-Amorós (7) and Juan C. Oteyza (8). Retrieved from Explora Magazine, 2013 (5, 7, 8); and from https://www.climbing.com (6).

5.3 – **The Real Wealth of the Region**

Natural and cultural resources at the base of local development

The biodiversity of the Venezuelan Guayana has enormous proportions. If this richness is paired with the unique scientific value of its geographical features, together they can become important drivers for the sustainable development of the region. The Guiana Shield is one of the oldest geological formations on earth, originated in the Precambrian more than 1.7 billion years ago (Huber, 1995, as cited in Bonaccorso, n.d.). One of the most characteristic features of this formation is the system of tepuis of the Guyana Highlands, with more than 50 table-top mountains and an extraordinary richness of endemic species that can only be found in these isolated plateaus (Sears, n.d.). Tepuis can mostly be found in the Venezuelan Guayana, with only a small percentage of these formations in western Guyana and the Brazilian State of Roraima. The uniqueness of these geographical features has stimulated a long tradition of adventure tourism in the Gran Sabana area, where most of the tepuis are concentrated, attracting Venezuelan and foreign hikers alike. But tepuis or other types of uplands and mountain ranges can also be found in other areas of the Venezuelan Guayana.

The natural assets of the region go well beyond the impressive system of tepuis. The tropical moist forests south of the Orinoco River have existed for more than 20 million years, and they are part of the larger Amazon rainforest. As such, they are considered one of the most species-rich terrestrial ecosystems in the world (Hoorn, 2010). This biodiversity, which has made Venezuela one of the most mega diverse countries in the world (Fernández et al., 2018), offers great opportunities for passive recreation activities such as botanic and wildlife tourism. More than 10.000 different plant species have been identified in the Venezuelan Guayana, a number which represents more than 60% of the country's flora (Fernández et al., 2018). And according to Rivas, Madi, Stachowicz & Isasi-Catalá, this region has the fourth largest concentration of amphibian species in the world, the sixth for birds, the eight for mammals, and the ninth for reptiles (Fernández et al., 2018).

In terms of the impact biodiversity could have on employment opportunities, it is worth mentioning that birdwatching alone has become one of the leading activities of the ecotourism sector, with more than 70 million practitioners worldwide (Dávila & Montenegro, 2018), and that in the Venezuelan Guayana there are more than 650 different bird species (Fernández et al., 2018). These numbers help to give an idea of the magnitude of jobs and businesses related to ecotourism that could be created. There are also great opportunities for more active forms of recreation, which range from kayaking and rafting in the region's waterways, to canopying in between the tree crowns and paragliding from the top of the tepuis, among many other variants of adventure tourism. According to the UNWTO, 'the global tourism sector accounted for more than 235 million jobs in 2010 representing 8% of global direct and indirect employment, or one in every 12 jobs' (UNWTO, 2013, p. 81). Ecotourism has created more jobs in Costa Rica than the mining sector (Watkins, 2018), contributing with 3,8 billion US dollars to the national economy in 2018 (ICT, 2019). And tourism in general is one of the most dynamic sectors in many developing countries across the world, 'with a wide range of upstream and downstream effects on other economic activities thanks to a very large and diversified supply chain' (UNWTO, 2013, p. 16).

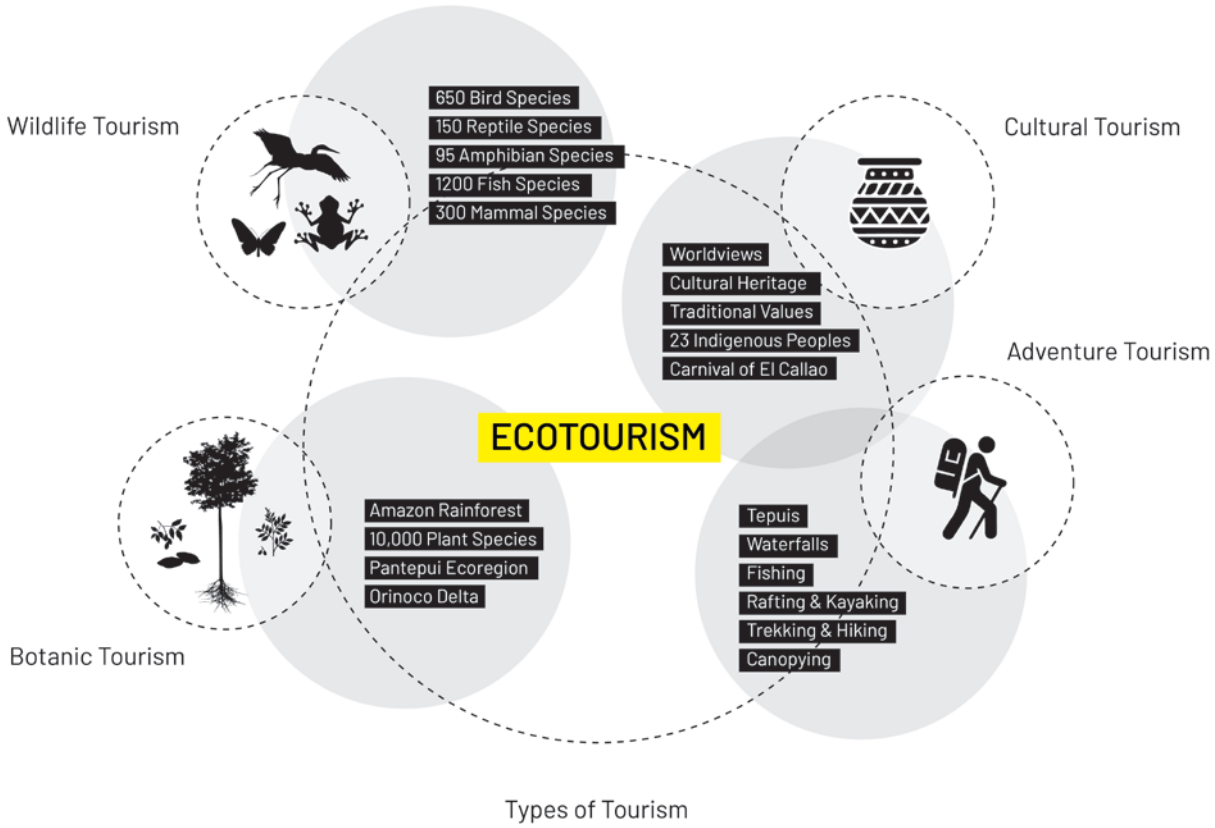


FIG. 5.24 Diagram that illustrates the different types of tourism and the wide range of activities that could be developed in the region, fostering local sustainable development. Source: made by the author.

The cultural heritage and the ancestral values of the 23 indigenous groups that live in this region also becomes an important opportunity for other forms of sustainable tourism, promoting community development and the protection bio-cultural diversity. Indeed, both the World Tourism Organization (UNWTO) and The International Ecotourism Society (TIES) stress the role of ecotourism in the empowerment of local communities through capacity building and the creation of stable employment opportunities, providing a path to alleviate poverty while conserving their traditions (UNWTO, 2013; TIES, 2015). In addition, this type of sustainable tourism contributes to the understanding and tolerance of peoples with different worldviews, enriching and broadening the appreciation of tourists for nature, local societies and culture. Some of these groups live in voluntary isolation and this must be respected. Responsible ecotourism could provide a path for local sustainable development, strengthening their links with more urbanized areas in an indirect way, and thus facilitating their access to some goods and specialized services while avoiding migrations and transculturation.

FIG. 5.25 Diagram that illustrates the potential of tropical moist forests to support local communities. By promoting the harvesting of non-timber forest products with high-market value, new economic activities can be generated in remote and peripheral areas. Source: made by the author.

It is important to find a way in which the preservation of biodiversity can also provide a path for local sustainable development, taking advantage of the enormous potential of the tropical forests for new forms of economy. Sustainable forest management, as ecotourism, offers great possibilities without diminishing the quality of the environmental services provided by the natural system. According to Figueroa, Sanoja and Delgado, indigenous communities of the Botanamo River basin inside the Imataca Forest Reserve make use of non-timber forest products that they harvest from 94 different tree species (2010). Some of these products have high value in the global market and could provide an alternative path for local sustainable development in the region. But this possibility requires a paradigm shift at all levels because it implies going beyond outdated notions of preservation, forcing the national government to rethink the objectives of the protected natural areas. With such an approach, their protection could become more productive and feasible, but the relevance of their boundaries would also be questioned. Should sustainable forest management be limited to the protected areas? Or could this broadened approach that links preservation with community development be extended beyond those 'green islands'? As Slavoj Žižek has provokingly stated (2008), 'the ultimate obstacle to protecting nature is the very notion of nature we rely on'. An additional and important observation must be made regarding the commercialization of NTFP. According to José Rafael Lozada, a respected Venezuelan scholar and forest engineer, if the supply of certain NTFP with high market value increases, the prices of those commodities could drop (personal communication, June 1, 2019)

5.4 – **The Territorial Dimension of Endogenous Growth**

Spatial interventions to facilitate conditions for development

FIG. 5.26 The main headquarters of the UNEG, in Ciudad Guayana. This regional university is also present in Ciudad Bolívar, Upata, Caicara del Orinoco, Guasipati, El Callao, and Santa Elena de Uairén. Retrieved from http://800noticias.com

FIG. 5.27 The small airpot of Santa Elena de Uairén, capital of the Gran Sabana municipality and the largest town along the border with Brazil. Retrieved from http://museodeltransportecaracas.blogspot.com

FIG. 5.28 As part of a solar power project in Brazil, indigenous communities learned how to install and maintain solar panels. Photograph taken by Traci Romine. Retrieved from https://www.mott.org

To facilitate the emergences of new economies, an important set of programmes and interventions will be needed throughout the region. The diffusion of innovation and knowledge becomes crucial, especially if the potential of the forest to generate new economies beyond tourism is to be unleashed. Indeed, the forbidding scale of the Amazon rainforest and its apparent sameness has historically led cartographers to depict it as a single mass of indeterminate content (del Hierro & Leggett, 2010). But this limitation must be overcome so that a local sustainable development can be stimulated. A system of regional research centers supported by a larger network of NGO's, universities, and public and international agencies, could play an important role in the characterization of the forest, the discovery of new species, and the investigation of their potential for new synergies and economies. The cooperation of these research centers with indigenous peoples would be desirable, since their forest-related knowledge can be learned while fostering local development in remote areas.

Links can also be made with a number of national and international manufacturers interested in non-timber forest products, so as to promote local processing and the development of specialized economies in the region. Tonka beans have an intense flavor and a complex aroma that make them a suitable vanilla substitute and a desirable ingredient for gourmet chefs and food manufacturers around the world (Gorvett, 2017). Copaiba, another non-timber forest product of the forest that can be found in this region, is widely used for medicinal purposes because of its antiseptic, anti-inflammatory and expectorant properties. In addition, both copaiba oil and balsam are used as ingredients for the manufacturing of soaps, perfumes and cosmetics (Price, 2018). These are only some examples of the potential uses of merely two ingredients that can be found in the tropical forests of the Venezuelan Guayana. Finished or semi-finished goods could be manufactured in the region, creating new employment and adding value to the raw products of the forest. If conditions are facilitated, and with the creation of adequate policies and incentives, it will be possible to attract small and medium manufacturing enterprises to the peripheral towns and villages of the region.

As Vázquez-Barquero and Rodríguez-Cohard have stated (2017), energy also plays a fundamental role in social and economic development. Indeed, manufacturing industries will demand large amounts of energy, and the region does not have the capacity to provide it nowadays. Almost two thirds of the Venezuelan population depend on the energy that is generated by the system of hydroelectric dams along the Caroní River, and the current demand greatly exceeds the generation capacity. But there is great potential for the generation of solar energy in Venezuela. And if this potential is unleashed with policies and incentives, a large part of the national grid could be decentralized while still generating clean renewable energy. In the Venezuelan Guayana, the introduction of solar farms would create new opportunities for local administrations, private companies and local initiatives alike, since development strategies could be carried forward regardless of the energy rationing programmes set out by the national government today. Even in an optimistic scenario in which planning, investments and maintenance is rescued

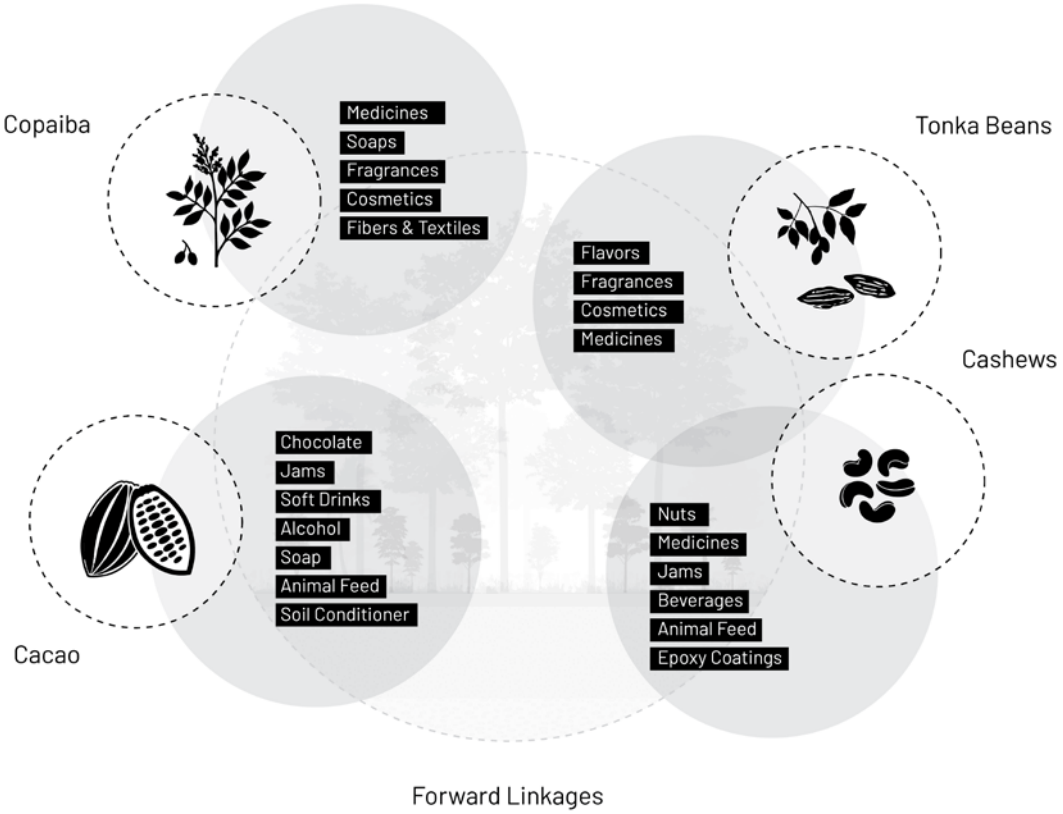


FIG. 5.29 Diagram that illustrates the potential of non-timber forest products with high market value to support local manufacturing. By processing the forest products and creating added value with finished or semi-finished goods, new windows of opportunity are opened for local sustainable development. Source: made by the author.

and the national electrical grid is improved, it is highly probable that it will take some time and that priority will be given to the large urbanized areas of the country, hindering the possibilities of local development in peripheral towns and villages. The wastelands created by illegal mining activities, which can hardly be reforested because of the poor quality of the soils in this part of the country, could be suitable for the installation of solar farms. Incentives could therefore be created to couple this strategy with soil remediation programmes.

Education and capacity building programmes are fundamental, since they provide new skills to local communities and stimulate entrepreneurship. A system of community centres should be promoted throughout the region to host these programmes, facilitating access to information while providing space for unexpected uses. Once new skills have been acquired, entrepreneurs will be able to combine the scientific knowledge of the research centers with the natural and cultural resources available in the territory, giving place to new local initiatives. Specialized business services to support these activities need to be attracted, especially to the towns and small cities of the Venezuelan Guayana. And a wide range of projects will also be required to enable tourism, such as lodging facilities, the development of new tourism routes, the upgrade of some strategic airports, and the promotion of small local ports along main rivers in remote areas. These are only some examples to illustrate the territorial dimension of endogenous development and the role of urbanism to facilitate the emergence of new economies.

5.5 – **Measures, Adjustments and Adaptations**

Some considerations for a healthier implementation environment

Illegal small-scale mining and tourism are not a good match, especially if they take place in close proximity to one another. This type of resource extraction brings environmental degradation and violence wherever it goes, and as many journalists and NGOs have reported in recent years, the Venezuelan Guayana may very well be one of the most dangerous and violent regions in the continent (International Crisis Group, 2019). Violence needs to be controlled and the rule of law must be restored for ecotourism to thrive. This necessary precondition was ratified by Jon Bruno, Executive Director of The International Ecotourism Society, who wrote to the author that 'the potential for ecotourism [in Venezuela] is very great, and if the country were safe for tourists we estimate there would be an ecotourism boom' (personal communication, April 6, 2019). But the current dependence on resource extraction can only be progressively reduced by creating alternative employment opportunities for local communities. Therefore, the restoration of the rule of law by the public sector and the restructuring of the territory to create the conditions for these new economies must go hand in hand.

The possibility of a development path based on the sustainable management of the natural forests needs the active support of the highest levels of government, mainly because it is the state who owns the resources that lie underground. The central government has the power to discourage the environmental degradation that is taking place by restricting mining in certain areas or even by banning extraction altogether. But of course, this requires a profound paradigm shift, since a shared vision needs to be built to preserve the nation's natural assets, even if there are valuable resources underground. As evidenced in the review of some comparative references in the Americas, the role of NGOs and civil society in the creation of public awareness is fundamental, and sometimes it can have a profound impact on the way the government acts. A more efficient management of the protected natural areas, capable of integrating a productive dimension to the notion of preservation, also depends on the restructuring of the government structure.

As González Rivas, Malaver and Naveda Sosa remark (2015), the agencies and organizations responsible for these areas must adapt and learn to work in networks, engaging with stakeholders from all levels and sectors. New windows of opportunity can be opened with this decentralized approach. Financial mechanisms to charge for the environmental services provided by the forests are a possibility that many international agencies offer (Dourojeanni, 1999), and some successful initaitives have already taken advantage of this in the region. But in general, the conditions that facilitate the flourishment of new activities are still very weak. According to scholars (Acemoglu & Robinson, 2012; Vázquez Barquero & Rodríguez-Cohard, 2017) and development agencies (UNDP, 2009), the strengthening of the institutional system becomes fundamental to increase the absorptive capacity of local communities for innovation; and to enable actors to take part in global value chains and international markets. If public institutions become more flexible and allow actors from all levels and sectors to work in decentralized networks, they will be able to set the path for local sustainable development in the region; reducing its current dependence on resource extraction and creating wide range of new employment opportunities.

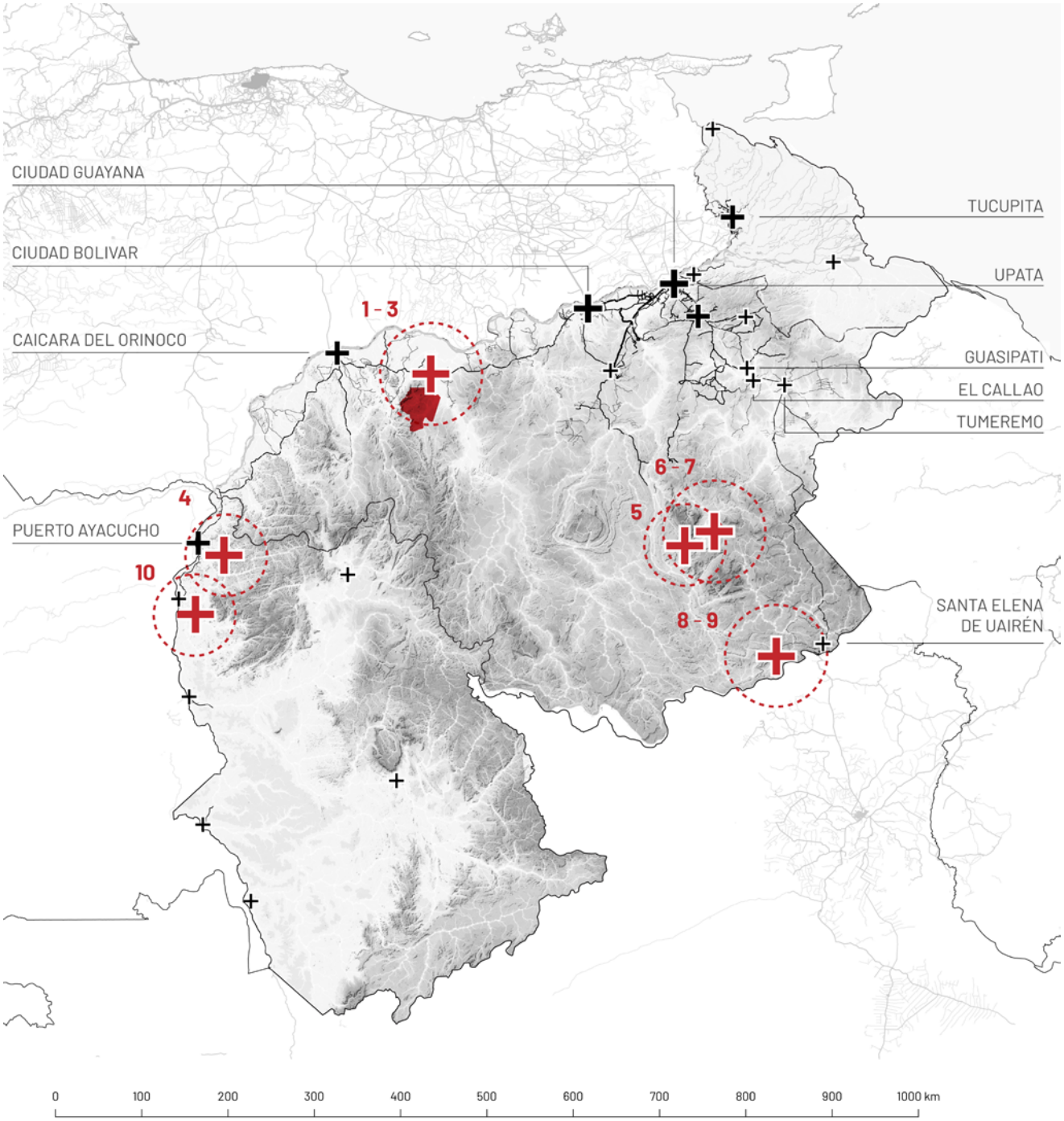
PART 3

Towards a Self-Sufficient Region

Exploring a possible future for the periphery

“Would you tell me, please, which way I ought to go from here?” asked Alice.
“That depends a great deal on where you want to get to,” said the Cat.

[Lewis Carroll, Alce in Wonderland]



Local Initiatives in the Venezuelan Guayana

- Conservation Agreement (PhyNatura)
- Local Initiatives
- Main Centralities
- Capital Cities and Towns
- State Boundaries
- Municipal Boundaries

1 - 3 PhyNatura; Afrodescendientes de Aripao; Fundación La Salle
4 PROBIODIVERSA
5 Campamento Turístico Uruyén
6 - 7 Kavak-Lodge Karan Tapüyi; Fundación Etnika
8 - 9 Fundación Granja Idea Verde; Fundación Mujeres del Agua
10 FUDECI

6 – Initiatives for Change

Local Initiatives in the Venezuelan Guayana

It is clear that the generation of new economic activities is much needed, especially in remote and peripheral areas. Otherwise it will be extremely difficult to overcome the current dependence on resource extraction. Endogenous growth theory has provided insights into what should be done to facilitate the emergence of local initiatives. And the potential of the Venezuelan Guayana for ecotourism and sustainable forest management, among many other latent possibilities, has also been mentioned above. But what has not been said is that there is a considerable number of initiatives in the region that are already creating sustainable alternatives for local communities. In the following pages, some of these enterprises will be briefly described to present a more optimistic narrative of the Venezuelan Guayana. One that is focused on the seeds for change that are already growing.

LOCAL INITIATIVES IN THE VENEZUELAN GUAYANA

NAME	TYPE OF INITIATIVE	STATE
PhyNatura	Biodiversity	Bolívar
Afrodescendientes de Aripao	Biodiversity	Bolívar
PROBIODIVERSA	Biodiveristy	Amazonas
Fundación La Salle	Ecotourism	Bolívar
Campamento Turístico Uruyén	Ecotourism	Bolívar
Kavak-Lodge	Ecotourism	Bolívar
Fundación Etnika	Capacity Development	Bolívar
Fundación Granja Idea Verde	Capacity Development	Bolívar
Fundación Mujeres del Agua	Capacity Development	Bolívar
FUDECI	Logistics and Accessibility	Amazonas

FIG. 6.1 Map with the spatial distribution of some of the local initiatives that exist in the Venezuelan Guayana. Source: made by the author.

The investigation of local initiatives in the region was made by interviewing a series of environmentalists, journalists and entrepreneurs. The author is particularly grateful to the help given by Carlos Peláez (education and sustainability director of Provita , a Venezuelan environmental NGO), Jeanfreddy Gutiérrez Torres (a Venezuelan environmental journalist), and to Luis Jiménez (forest engineer and founder of PhyNatura). All of these local initiatives are included in the list of Venezuelan enterprises inscribed in the GEF Small Grants Programme, and most have an important environmental dimension aimed at strengthening the capacities of local communities for endogenous growth. The challenge is to find a way in which these initiatives can be multiplied. But before, a vision will be proposed for the entire region, paired with a set of strategic goals and a regional strategy. This vision will become the framework for the explorations that will then be made by selecting a specific case study for a demonstration project.

FIG. 6.2 Members of PhyNatura and from the Civic Association of Afro-descendants of Aripao, sorting tonka beans in the moist forests of the Caura River basin. Source: courtesy of PhyNatura.

FIG. 6.3 Marcos Pérez, an indigenous Yekwana, in the moist forests of the Caura River basin. Retrieved from https://news.mongabay.com

FIG. 6.4 Locals actively grow, gather and process their agroforestry crops in Aripao, where PhyNatura and the Civic Association of Afro-descendants work hand in hand. Image by Jeanfreddy Gutiérrez. Retrieved from https://news.mongabay.com

FIG. 6.5 Two different varieties of cacao pods, produced in Tadakwaña and taken to the Ye'kuana village of Sayusodiña to start a cacao plantation. Source: courtesy of PhyNatura.

PhyNatura
Biodiversity Project - Maripa, Bolívar State

In recent years, Ye'kuana indigenous communities in the Caura River basin have developed strategies to produce organic cocoa under a shade tree cover using agroforestry systems, allowing them to obtain cocoa beans and a certain amount of other non-timber products such as the tonka bean, highly valued by the perfume industry. These organic products can be sold in local and foreign markets, providing a sustainable alternative to the extractive economy. This experience has been successful, since the communities have learned and implemented the appropriate techniques for the cultivation of cocoa and its post-harvest management, having a positive impact on their economy. The agroforestry techniques play an important role in the preservation of more than 147.000 hectares of rainforest (Gutiérrez Torres, 2018), but also in the provision of ecosystem services in the long-term. More than 2.200 persons and 50 families have benefited from this initiative, which is currently developing a second phase of a broader plan.

This large project works under a conservation agreement model, in which the different communities involved receive funding or a series of benefits in exchange for making specific conservation commitments -in this case, to protect a part of the Caura forest reserve from uncontrolled hunting, logging and illegal mining. Nonprofit organizations such as Conservation International, but also the European Union, have funded several phases of this significant initiative. It provides an interesting model for similar ventures in other areas of the region that also have a unique ecological value. And it constitutes an experience in which locals have found a way to benefit from the demand of certain products in the global market, going beyond extraction and conservation, and without compromising the environment or their lives. Indeed, the tonka beans that are harvested in the moist forests are then sold to Givaudan, a major Swiss manufacturer of flavors, fragrances and consmetics.

FIG. 6.7 The intermediary between the people of Aripao and a local company that buys the community's agroforestry products. Image by Jeanfreddy Gutiérrez Torres. Retrieved from https://news.mongabay.com

FIG. 6.6 Fundación La Salle has been leading the Turtle Conservation Program from more than eight years, creating a socio-productive alternative to mining. Source: courtesy of Fundación La Salle.

Asociación Civil Afrodescendientes de Aripao , Bolívar
Biodiversity Project

The initiative aims at strengthening a successional agroforestry system that will contribute to the preservation of biodiversity and local traditions -such as the sustainable use of the tonka seeds from the *Sarrapia* tree- in the Aripao parish, a section of the Sucre Municipality in the Bolívar State. The project is part of a larger strategy that promotes the development of sustainable economic alternatives for the local communities, complementary to the conservation of the Suapure forest in the Caura River basin. The initiative encourages locals to make use of short, medium and long-term plant associations directed towards the creation of productive forest ecosystems in the deforested areas that surround their communities. The initiative, which works in close association with PhyNatura, is a laboratory of sustainable and environmental good practices. But it also fosters the maintenance of ancestral traditions and contributes to the strengthening of grassroots organizations and other existing projects. More than 82 families are benefitting from this initiative.

Fundación La Salle de Ciencias Naturales , Bolívar
Ecotourism Project

The initiative gives continuity to the Lower Caura Basin Turtle Conservation Program that Fundación La Salle has been carrying out for eight years in the region, with the participion of the indigenous and creole communities (Rojas-Runjaic, F., Ferrer, A., & Señaris, J., 2011). During this new stage of the program, Fundación La Salle intends to promote and consolidate ecotourism as a socio-productive activity in order to reduce the dependency of communities on resource extraction. In addition, the project will help to minimize the impacts that this activity is generating on biodiversity. To do this, tourism-related microbusinesses will be created, tourist promoters will be trained, routes will be established, and tourist packages will be offered to visitors within the country and abroad. At the same time, the turtle conservation program will be continued, maintaining the activities of ranching, breeding and freeing of turtles in the lower Caura basin. More than 62 families in the Aripao parish benefit from this program, currently under development.

ProBiodiversa, Amazonas
Biodiversity Project

From 2010 to 2013, important efforts were made by ProBiodiversa for the development of agroforestry systems in the Piaroa community of Gavilán (ProBiodiversa, 2011). Positive impacts on the environment and the families involved were observed, to the point that this form of agriculture stands as a model for the sustainable management of secondary forests, and for the provision of an alternative means of family life that moves away from extraction. However, there are important bottlenecks that must be addressed to ensure the continuity of this initiative in time, such as the difficulty to commercialize and incorporate the produce into the agri-food system. For this reason, ProBiodiversa aims to focus in agroforestry products with added value, in the incorporation of those goods in the consumer market, and in the articulation of strategic actors in the agri-food chain. 221 people benefitted from this initiative, but also 551 people benefitted indirectly in some way. The implementation of the project was completed successfully in 2013.

FIG. 6.8 Part of the ecotourism infrastructure built for the Uruyén Camp, in the indigenous community of Uruyén. Retrieved from https://mapcarta.com

Cooperativa Campamento Turístico Uruyén , Bolívar
Ecotourism Project

This initiative gives continuity to a previous project that aimed at the development of a sustainable ecotouristic experience in the indigenous community of Uruyén. With the funds received in the first stage of the project, locals renovated four traditional buildings and built two new ones to improve the ecotourism infrastructure. Instruments were designed to assess the ecotourism capacities of the community, and a team of specialized professionals designed the program and the training workshops. Fieldwork was carried out to identify relevant natural touristic attractions around the area, and ecotourism routes were formally designed with the community to improve its capacity for guiding and serving visitors. Around 50 families are benefitting from this initiative, currently in a stage of development.

Comunidad Indígena de Kamarata Kavak-Lodge Karan Tapüyi , Bolívar
Ecotourism Project

Kavak is an indigenous community of the Pemón ethnic group located in the Kamarata valley, inside the Canaima National Park. It can only be accessed by river or with small planes. In the 1980s, together with the Kamarata, Kamadac and Santa Marta communities, Kavak engaged in ecotourism activities, developing camps with basic tourist services. These communities are planning to improve the infrastructure of the camps and the quality of their services, and for this reason they want to implement a national and international promotion plan which will increase the annual number of tourists. More tourists will result in an increase of job opportunities in ecotourism to the detriment of mining. In the long run, such a shift will contribute to a reduction in the rates of deforestation, a greater capacity in carbon sequestration, and the preservation of the Amazon's biodiversity. More than 175 people are benefitting from this initiative.

FIG. 6.9 The cabin built by Paolo Patritti and Levis Díaz, which is part of the Granja Idea Verde agroecological project, in the village of El Paují. Source: courtesy of Paolo Patritti.

FIG. 6.10 One of the three artificial fish ponds that have been designed and built for aquaculture. Source: courtesy of Paolo Patritti.

FIG. 6.11 One of the greenhouses built by Paolo Patritti and Levis Díaz to grow food under controlled conditions. Source: courtesy of Paolo Patritti.

Fundación Etnika , Bolívar
Capacity Development Project

This project aims to create a Cultural Center for the indigenous community of Kamarata, in the Canaima National Park, by renovating a building in the Missionary Center our Lady of Coromoto. The structure was abandoned for several years, but in 2016 it began to be used by some cultural groups -mainly composed of young locals- with the purpose of rescuing their culture, ancestral heritage and the conservation of the environment. The project is part of the community agenda initiatives derived from the Pemón People's Life Plan, developed in 2006 with the support of the World Bank, to initially benefit children and young people attending local schools, extending progressively to all the communities of the valley, as a meeting place and cultural exchange. The cultural center is a long-term collective construction project with an immediate local impact; but it is also framed in a global context, since it addresses cross-cutting themes for humanity such as biodiversity, conservation and climate change. It is an opportunity to transform and enhance capacities of this small community from resilience and sustainability towards a more endogenous model of growth. According to the GEF Small Grants Programme website, 173 families benefit from this initiative and it is currently being developed.

Fundación Granja Idea Verde, Bolívar
Capacity Development Project

The Fundación Granja Idea Verde -spanish for green idea farm foundation- is located in the municipality of Gran Sabana, in an area of the Ikabarú parish which belongs to the territories of the mixed indigenous community of Karawaretuy, better known as El Paují. This area is within an ABRAE zone -an acronym for areas under special regimes of administration- since it is considered a National Hydrographic Reserve that protects the upper basin of the Caroni River, while also being a buffer zone for the Canaima National Park. At the site, over the course of 20 years, an ecological farm project has been developed by Levis Díaz and Paolo Patritti. There, different sorts of projects are in operation; including a series of artificial fish ponds for aquaculture, greenhouse horticulture, and reforestation practices -among other projects.

According to the promoters of this initiative, it is important to document the experience and turn it into a successful case study that could be replicated in other communities throughout the region. They have placed particular emphasis to the promotion of the CIOP model -an acronym for permanent and organic integral garden, or *conuco integral orgánico permanente* in spanish. This is the reason why the creation of a Training Center has been proposed, so that neighboring communities can learn productive activities that could provide alternatives to mining. Such activities range from techniques for the conservation of soils, strategies for the reduction of carbon emissions and carbon sequestration, and the generation of clean and sustainable energy. The idea is to add value to the ancestral knowledge of indigenous peoples, improving their quality of life and contributing to mitigate the effects of climate change through the preservation of biodiversity and the remediation of land degradation. More than 2.000 people will benefit from this initiative, which is currently in a development phase.

FIG. 6.12 A group of indigenous women, equipped with instruments that will be used to remediate degraded soils, on their way to work. Retrieved from http://fundacionmujeresdelagua.blogspot.com

FIG. 6.13 One of the 11 ecotypes of pineapple that is being harvested by the indigenous community Betania de Topocho, in the Atures Municipality, with the help of FUDECI. Source: Betancourt, 2006.

Fundación Mujeres del Agua , Bolívar
Woman Empowerment and Soil Remediation Project

This project is being developed since 2009 in the village of El Paují, in the upper basin of the Caroní River and close to the border with Brazil. It aims to provide a solution to the socio-environmental impacts generated by illegal gold mining, which result in the degradation and pollution of entire watersheds, the abandonment of traditional agricultural activities, the marginalization of women who have difficulties in carrying out such activities while raising families on their own, the degradation of families because of alcohol consumption, and school dropouts among young locals. Altogether, these social byproducts of the extractive economy have generated the loss of values that ultimately affect women, the community and nature. Fundación Mujeres del Agua proposes to empower indigenous women through the remediation of degraded areas with agroforestry systems, providing them with tools to recover food autonomy. New techniques will be incorporated into traditional planting practices, sustainable methods will be developed for the processing of the products, and leadership among indigenous women will be promoted with this program. 10 families will benefit directly from this program, and 50 others will also profit indirectly in some way. The initiative is currently in a stage of development.

FUDECI , Amazonas
Logistics and Accessibility Project

The Amazonian fruit trees have great commercial potential and because they are endogenous species that can be easily produced under the extreme climate and soil conditions of the Amazon rainforest. In addition, they are also part of the local indigenous culture. However, productivity and subsequent distribution is inefficient and very limited due to lack of technical support, distribution mechanisms and marketing. Many indigenous families suffer from poverty, so the products of these fruit trees could provide an economic alternative for their well-being. The project created an adequate and safe means of transport for the distribution of fruits and related goods to the city of Puerto Ayacucho for its further commercialization. Communities were also trained in the production of seedlings to increase the number of cultivated areas. 60 families benefitted from this initiative, successfully completed in 2015.

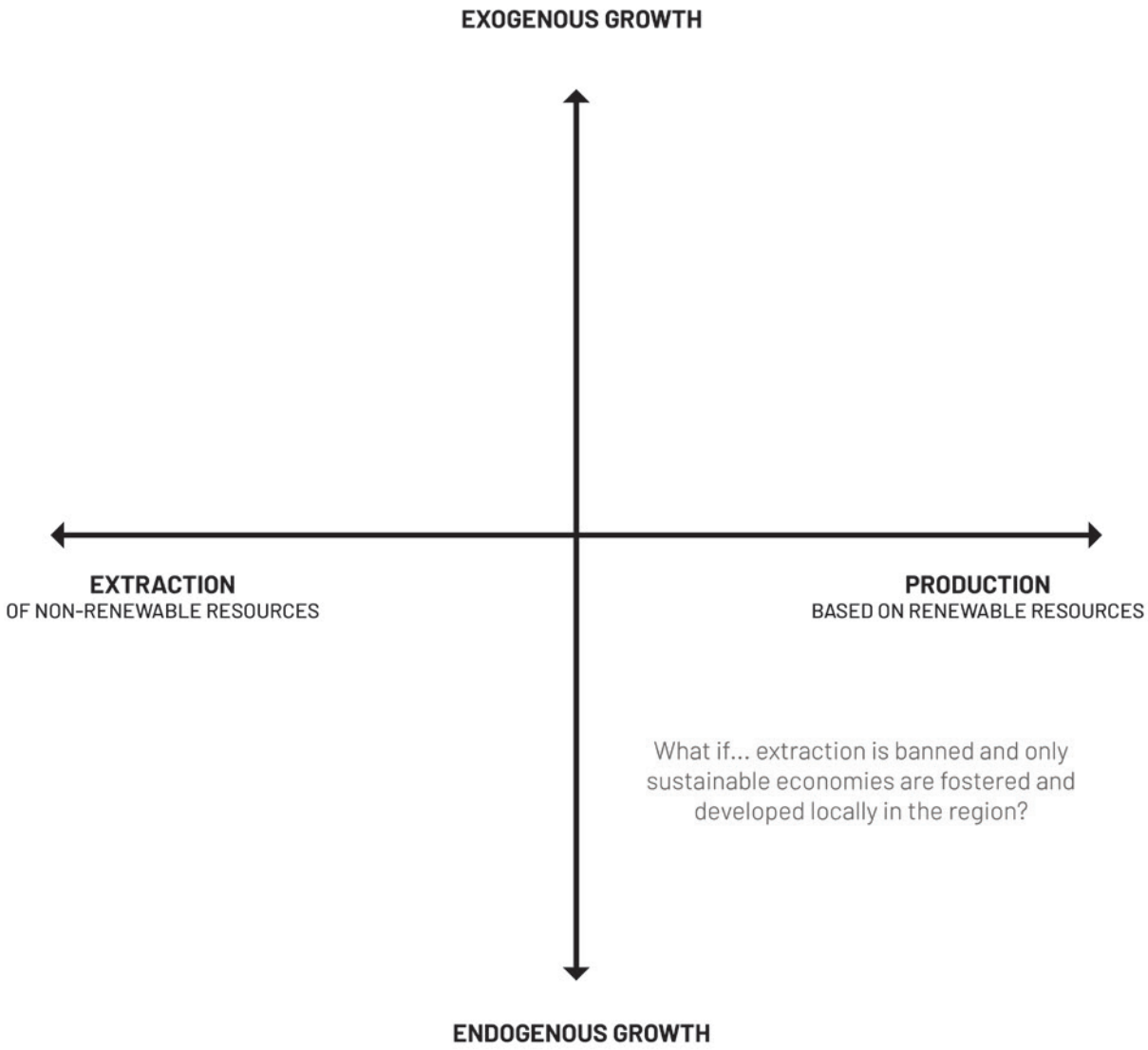


FIG. 6.14 Scenario matrix that shows four different directions that the Venezuelan Guayana could follow in the future. A regional strategy aiming for local development, based on the sustainable use of the natural and cultural resources of the territory, could seem far-fetched to some. But many local initiatives already follow this alternative path in the region. Source: made by the author.

7 – A Vision for the Venezuelan Guayana

Vision statement, strategic goals and a regional strategy

The analysis of comparative references in the Americas showed that a resource-rich country can say "No" to mining; and the regional scale analysis, along with the literature review on endogenous growth theory, evidenced that it is important to explore alternative forms of development in such a sensitive and challenging region like the Venezuelan Guayana. Indeed, the biggest threats to both people and nature are being felt in remote and peripheral areas, where traditional notions of development are highly conflicting because of the fragility of the Amazon, the world's largest tropical forest. The research made to this point allowed for the construction of a scenario matrix with several possible futures, but only one of them could be explored in detail due to time limitations. One axis of the matrix goes from an extractive model in which the national economy continues to rely on the exploitation of non-renewable resources, towards a productive model in which alternative economies based on the sustainable management of renewable resources are strongly promoted. The other axis goes from an exogenous development model in which the national economy mainly reacts to the pressures of the global market, towards an endogenous growth model in which conditions are created to facilitate the growth of local initiatives from the bottom-up. To build a vision for the region, the productive and endogenous scenario was chosen for several reasons: first, because of the unique ecological and scientific value of the region; second, for the cultural richness of the indigenous populations that inhabit the territory; third, because of its peripheral condition, which shows a clear correlation between lack of alternative opportunities and dependence on mining; and fourth, because of the risks posed by an economy that only relies on resource extraction.

7.1 – **Vision Statement**

The vision aims for a self-sufficient and productive region, in which the diffusion of technology, innovation and knowledge creates the conditions for the growth of local initiatives that seek to make use of the potential that is present in the territory in a sustainable way. By fostering the development of specialized and complementary centralities that collaborate with one another, new employment opportunities will be created throughout the region, reducing its current dependence on resource extraction. This progressive shift from a vicious extractive cycle towards a self-reliant and sustainable one will minimize the exposure of the local population to external factors while improve their living conditions from an environmental, social and economic point of view. flexible governance structures, infrastructure, punctual interventions, and

A linear cluster of mining towns has been selected as a case study and demonstration project to test the potential of the vision. While natural and cultural resources create the conditions for local development, the morphological structure of the cluster facilitates the activation of a polycentric urban region. This spatial strategy will be able to enhance the competitiveness and the economic performance of the three towns along the trunk road by fostering a common identity and closer collaboration, based on their complementarities and different forms of specialization.

7.2 – **Strategic Goals**

- The promotion of new economic activities and employment opportunities in peripheral and remote areas, so as to generate sustainable alternatives to resource extraction.

- The improvement of spatial and environmental qualities in peripheral urban centers, so as to ameliorate the living conditions of local communities.

- The enhancement of local competitiveness, by facilitating conditions for initiatives to develop from the bottom-up.

7.3 – **The Regional Strategy**

- Seeks the improvement of connectivity among centers within sub-regions, so that new opportunities can be reached by all.
- Seeks to build capacities and capabilities among communities to promote entrepreneurship and self-sufficiency.
- Seeks the diffusion of technology, innovation and knowledge throughout settlements to foster the growth of local initiatives.
- Seeks the promotion of clusters and new industrial spaces with a smart specialization approach, focused on activities rather than sectors.
- Promotes the development of strategic projects and punctual interventions that improve living conditions in the long-term.
- Fosters collaboration among centres across the region with incentives and by adapting the existing government structures to make them more flexible.

PART 4

Turning Urban

The case of Guasipati, El Callao and Tumeremo

“El Callao tonight, Tumeremo tomorrow night,
El Callao tonight, Guasipati tomorrow night”

Serenata Guayanesa, Calypso del Callao [Traditional Song]

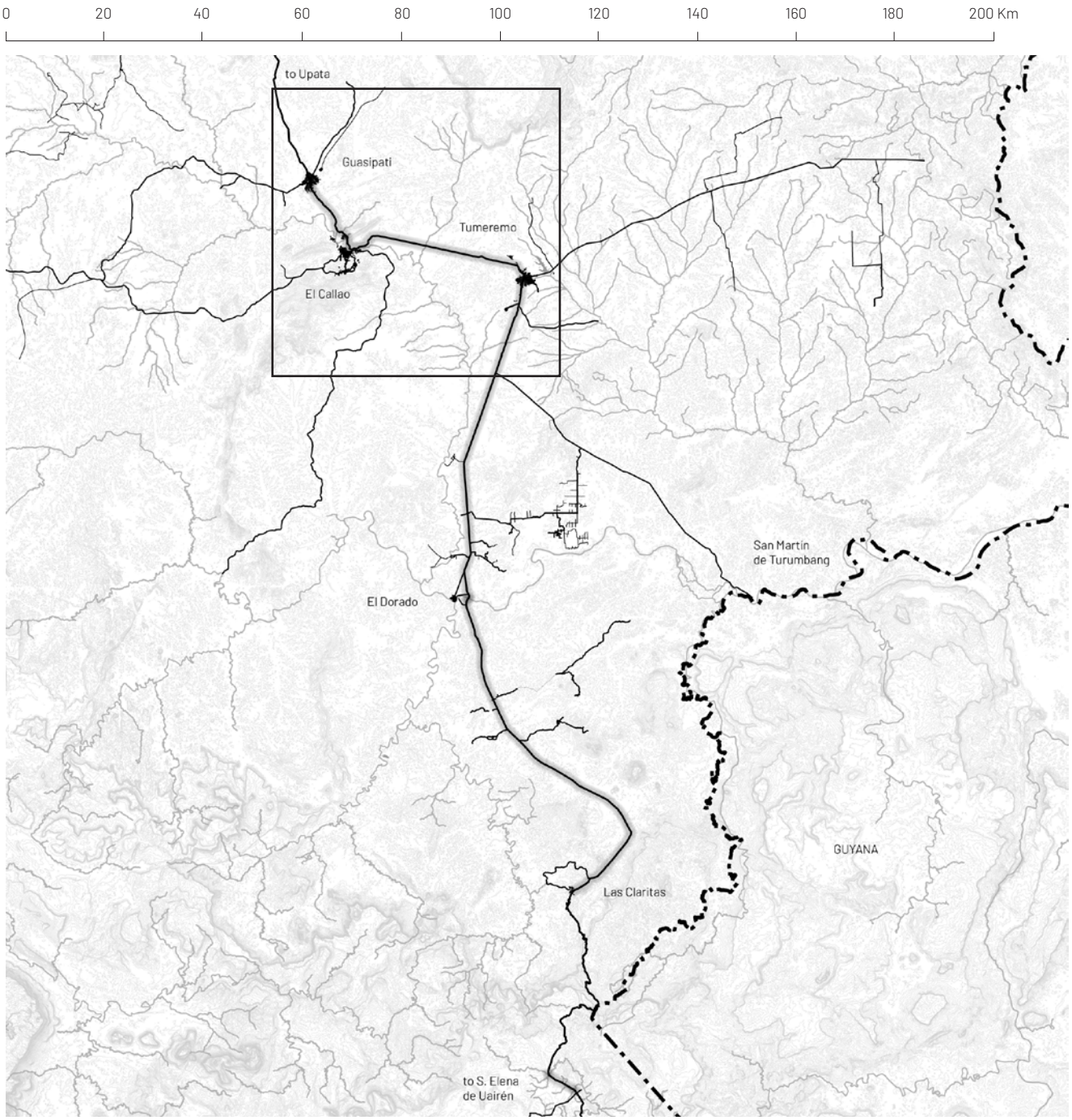
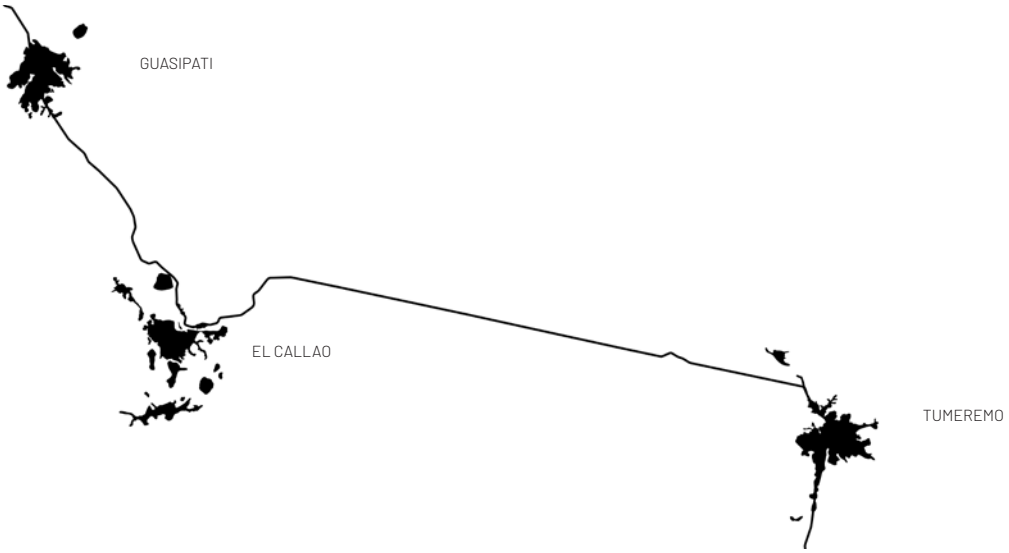


FIG. 7.1 The peripheral area selected as a case study, where a demonstration project will be explored, presents a series of small towns along the regional trunk road that connects Venezuela with Brazil. These towns have a long gold mining tradition since the XIX Century. Guasipati, El Callao and Tumeremo, but especially El Dorado and Las Claritas, are the gold extraction hotspots of the region. Source: made by the author.



8 – Clustering New Possibilities

Working with the spatial affordances of an existing settlement

FIG. 8.1 To explore the potential of the case study for endogenous development, the northern part of this territory was chosen. Here, the towns of Guasipati, El Callao and Tumeremo present a set of spatial conditions that can be associated with the polycentric urban region concept. Source: made by the author.

A series of small towns along the trunk road that connects Venezuela with Brazil have had a long gold mining tradition since the nineteenth century. Guasipati, El Callao and Tumeremo, but especially El Dorado, Kilómetro 88 and Las Claritas, are the illegal gold extraction hotspots of the region today. Here, the environmental, social and economic byproducts of the extractive economy, previously described in another chapter of this report, are strongly felt. The area is in a fragile environment of tropical moist forests with great potential for other forms of economy, but which need especial consideration because of their fragility. According to the regional scale analysis made by the author, the area where these mining towns are located is clearly a peripheral one. To explore the potential for endogenous development, the northern part of this territory was chosen, since the mining towns of Guasipati, El Callao and Tumeremo present a set of particular conditions that differentiate them from other mining towns along the same trunk road, and that can be associated with the polycentric urban region concept. First, the cluster of towns will be evaluated according to the set of conditions described in the literature on polycentrism, to understand if it can be referred to as a polycentric urban region. Then, some possible interventions that may stimulate a favorable influence on subsequent economic growth will be outlined, taking advantage of the existing spatial structure of the cluster and fostering closer collaboration among the centers.

‘All Venezuela is here’

[José Contreras • El Callao, Bolívar]

Stories of Need

José Contreras is 41 years old. He used to live and work in Caracas, but the economic crisis and the lack of opportunities in the capital pushed him to migrate to the Venezuelan Guayana six years ago. Now he works in the mines of La Ramona, near El Callao. According to the last national census, this town has little more than 20,000 inhabitants. But Coromoto Lugo, mayor of El Callao from 2013 to 2017, estimates that in recent years the numbers of both permanent and floating population have increased exponentially and can be estimated around 100,000 (García Marco, 2018). Many migrants work directly in the mines, but others are employed in the informal market that is indirectly supported by the extractive economy.

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes. Some of the photographs that accompany the microstories come from the same source, but this was not possible in all cases. The idea is to give a picture of how people live in peripheral and remote areas of the Venezuelan Guayana.

García Marco, D. (2018, August 17). *Venezuela: la distorsionada economía que crea el oro en el lugar más rico (y violento) del país*. Retrieved from https://www.bbc.com/

FIG. 8.2 Artisanal miners in El Callao on their way to work. Photograph taken by Miguel García Moya. Retrieved from https://miguelgarciamoya.blogspot.com

'It is easier to find a gold merchant in El Callao than to encounter a bakery or a supermarket'

[Bram Ebus, journalist • El Callao, Bolívar]

Stories of Peripherality

In El Callao, mining and village life are deeply intertwined. In fact, the history of gold mining and the foundation of the town are one same story. According to Bram Ebus, most of the population is directly or indirectly involved in the extraction of gold, and this can happen in many ways. He says that "in the evenings, when most shops close up and when most miners dedicate themselves to their favourite activity –drinking– you will see people sweeping the floor in front of the gold shops, not only to clean, but to find gold. Flakes of gold can be accidently dropped by an uncareful salesman, and small shavings of gold get lost while burning the mercury amalgam, which is an activity that one prefers to do in front of the shop so that the toxic mercury fumes do not remain indoors" (2018).

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Ebus, B. (2018, January 15). *Digging into the Mining Arc. The destruction of 110 thousand square kilometres of forests in the largest mining project in Venezuela.* Retrieved from https://arcominero.infoamazonia.org/

FIG. 8.3 The owner of a gold pawn shop in El Callao. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org/

‘I have been working in the mine for about seven years and I am doing much better, now even more, with the crisis… Imagine, I have three children to support.’

[Jorge, gold miner • El Callao, Bolívar]

Stories of Dependence

Jorge has been working in the mines of El Callao for about seven years. He says that he is doing much better now, especially in the middle of the current crisis. ‘Imagine, I have three children to support… Here, at the minimum, I can make 20 or 30 thousand bolívares in no time. I bring out five or six sacks of material in one night, and from there I get two or three grams of gold’, he told to Nazareth Balbás. In July 2016, when this interview was made, the minimum wage in Venezuela was of little more than 33,000 bolivares per month. But not all the gold Jorge collects goes directly to his pocket. He needs to pay a percentage to the organized criminals that control the mine, to the taxi drivers that carry the sacks to the mill, and to the owner of the processing mill (Balbás, 2016).

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Balbás, N. (2016, July 5). *Vida bajo tierra: ¿Cómo se mueve la minería ilegal al sur de Venezuela?* Retrieved from https://actualidad.rt.com

FIG. 8.4 A worker just before grinding the ore, and two images of an illegal processing mill near El Callao. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

‘Mining zones are big, there are neighbourhoods with mining. If one neighbourhood has too much gold, another neighbourhood wants to enter. Not to work, but to rob with weapons in their hands and to get rid of the people’

[Anonymous gold miner • El Callao, Bolívar]

Stories of Violence

Villages around El Callao slowly become mines, but mines also become villages. It is not uncommon for a house to have a processing mill in its backyard, close to various holes in the ground that lead to subterranean mining galleries. Thousands of illegal small-scale miners work these shafts, which are in turn operated by orgnized criminal groups that collaborate with the army. Violent confrontations among the different gangs, fighting for the control of the mines, has become very frequent. According to Darwin Lizardi Tabor, the 28-year old local coordinator of the youth branch of the United Socialist Party of Venezuela (PSUV), violence and poverty are making El Callao a difficult place to live. His mother is even considering leaving her home-town (Ebus, 2018).

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Ebus, B. (2018, January 15). *Digging into the Mining Arc. The destruction of 110 thousand square kilometres of forests in the largest mining project in Venezuela.* Retrieved from https://arcominero.infoamazonia.org/

FIG. 8.5 An illegal gold mining camp near El Callao. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

‘I left school for the mine. My mom says that this isn’t life, but I cannot leave it because that’s how I help her. I’ve never known my dad’

[Ender Moreno • El Callao, Bolívar]

Stories of Dependence

Ender Moreno has been working in the mines since he was 10 years old and at 18, thin, covered in mud, shirtless and barefoot, he says that he seems himself as a miner until he dies. He works in the mine of La Culebra, near El Callao, but his dream is to have a processing mill one day. When asked about a group of youn men that was killed a few weeks earlier by the criminals that control the mine, he says “I’m very young, I want to enjoy life. But the time comes for everyone. One dies and we all know where we’re going” (Redacción EC, 2017). According to a Venezuelan human rights organization, almost half of the people that work in the mines of El Callao are children and adolescents (CECODAP, 2018).

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Redacción EC. (2017, March 20). *Venezuela: La minería de oro, un submundo de caos y violencia*. Retrieved from https://elcomercio.pe

CECODAP. (2018, December, 10). Informe especial:Peligros y Vulneraciones de DDHH de Niños,Niñas y Adolescentes en la Frontera y Actividades Mineras. Retrieved from http://cecodap.org.ve

FIG. 8.6 Ender Moreno, working 30 meters underground. Photograph taken by Juan Ballerto. Retrieved from https://elcomercio.pe

‘Of course I am infected, but what can I do?’

[Fernando Aníbal • El Callao, Bolívar]

Stories of Dependence

Fernando is 39 years old. He works in a processing mill on the outskirts of El Callao, under a zinc roof structure that resembles a car workshop. Every day, when the sun goes down, he and his colleagues finally obtain the gold after hours of grinding the ore miners bring to separate it from other low grade minerals. Doing that, Fernando exposes himself without protection to high levels of mercury all day long, every day. To obtain the gold, a colleague applies heat to mercury-gold amalgam balls that Fernando has made with his bare hands. This is a dangerous process, because the mercury evaporates and everybody in the mill inhales very high concentrations of the metal, which enters directly into the bloodstream and the brain, seriously affecting their health. (Zerpa, 2011).

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes. Some of the photographs that accompany the microstories come from the same source, but this was not possible in all cases. The idea is to give a picture of how people live in peripheral and remote areas of the Venezuelan Guayana.

Zerpa, F. (2011, April 21). *El Callao: Uso de mercurio en la minería causa estragos.* Retrieved from https://www.reportero24.com

FIG. 8.7 A worker in an illegal processing mill, manipulating water mixed with liquid mecury, in the village of El Perú near El Callao. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org

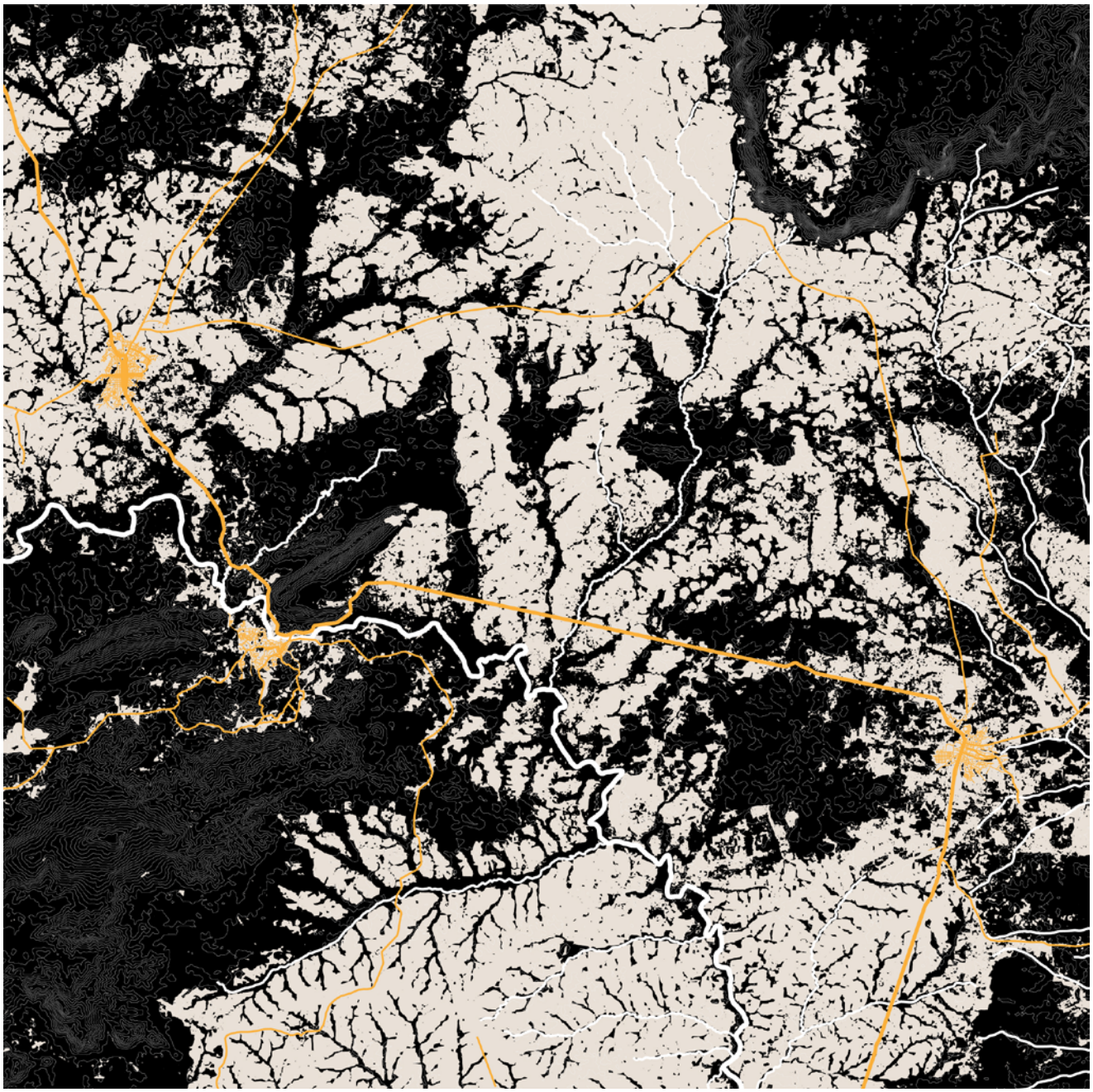
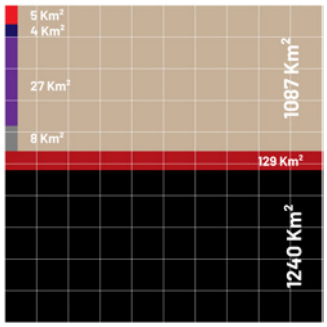
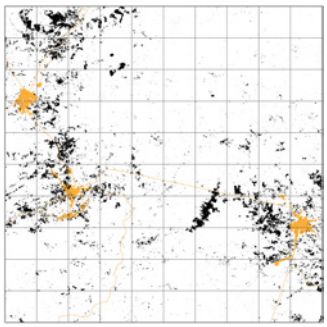


FIG. 8.8 If a 50 x 50 kilometre frame is made around the selected cluster of mining towns, it becomes evident that most of the surrounding landscape is made of savannas and large extensions of tropical moist forests. Source: made by the author.



Forest
Forest Loss
Savanna
Water
Urbanized Areas
Roads
Extraction Sites



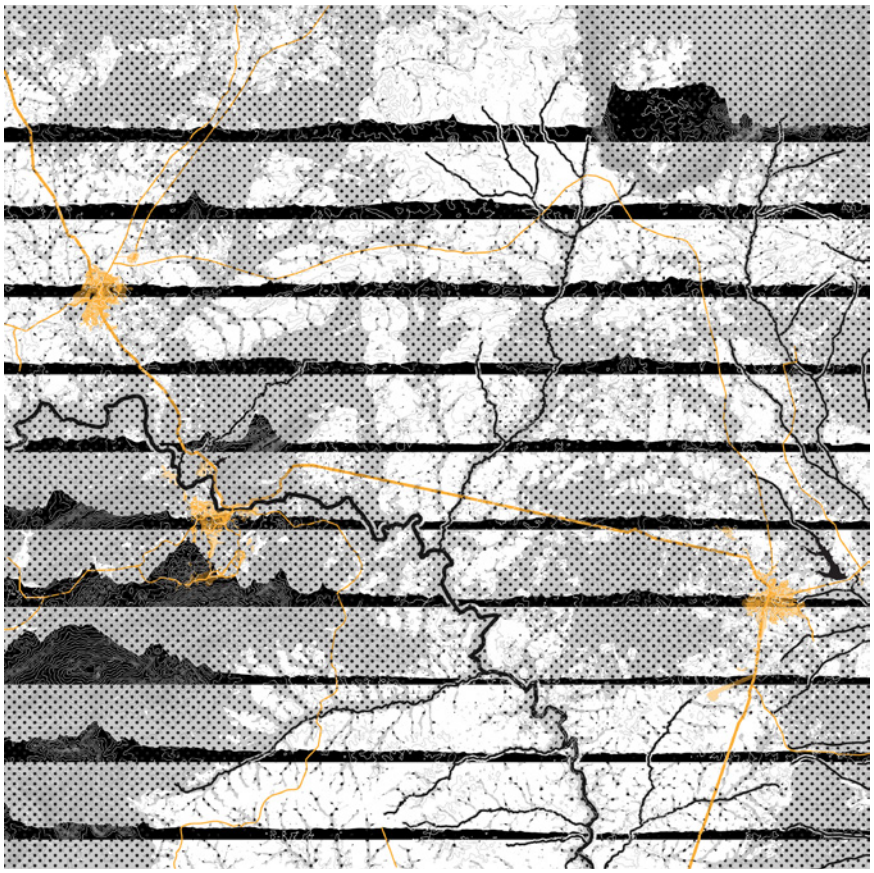


FIG. 8.9 Magnitude of areas within the polycentric urban region. Within a 50 by 50 kilometre frame, vast forested areas and savannas dominate the landscape (1,240 and 1,087 sq km respectively). But it also becomes evident that large extensions of forest have been lost to small-scale agriculture and livestock farming (129 sq km). Only 5 square kilometres of forest have actually been lost to mining. Source: made by the author.

FIG. 8.10 Magnitude of deforested areas within the PUR. Over the last 18 years, 129 square kilometers of tropical forests have been lost to human action in this 50 by 50 kilometre frame alone. This magnitude of this loss is 37 times the surface area of Central Park in Manhattan. Source: made by the author.

FIG. 8.11 Elevation profiles of the landscape. To the north-east, the Nuria upland mountain range appears as a unique feature inside the Imataca Forest Reserve. And south of the Yuruarí River, the hill range that surrounds the town of El Callao. Source: made by the author.

8.1 – **A Polycentric Urban Region in the Venezuelan Guayana?**

The PUR as a potentially useful model for local development

Compared to small and isolated villages like El Dorado and Las Claritas, the cluster of mining towns formed by Guasipati, El Callao and Tumeremo can be described as 'a set of neighbouring but spatially separate urban centres, existing as some identifiable entity' (Parr, 2004, p. 231). Because of its spatial structure, this cluster of urban centers can be easily associated with the Polycentric Urban Region model that has been developed and promoted in Europe in past two decades, especially after the publication of the European Spatial Development Perspective (ESDP) in 1999 (Bailey & Turok, 2001; Parr, 2004; Urso, 2016). The Polycentric Urban Region model (PUR) offers a strategic spatial framework with great potential for superior economic performance, based on the notion that a set of networked centers can complement each other and enhance their overall regional competitiveness (Bailey & Turok, 2001; Urso, 2016). By 'borrowing size' (Alonso, 1973), the combined efforts of a network of centers that collaborate with one another enables them to compete in markets that would have otherwise remained inaccessible, leading them to gain the benefits of agglomeration that characterize larger urban settlements (Parr, 2004; Docherty, Gulliver & Drake, 2004; Meijers & Burger, 2017).

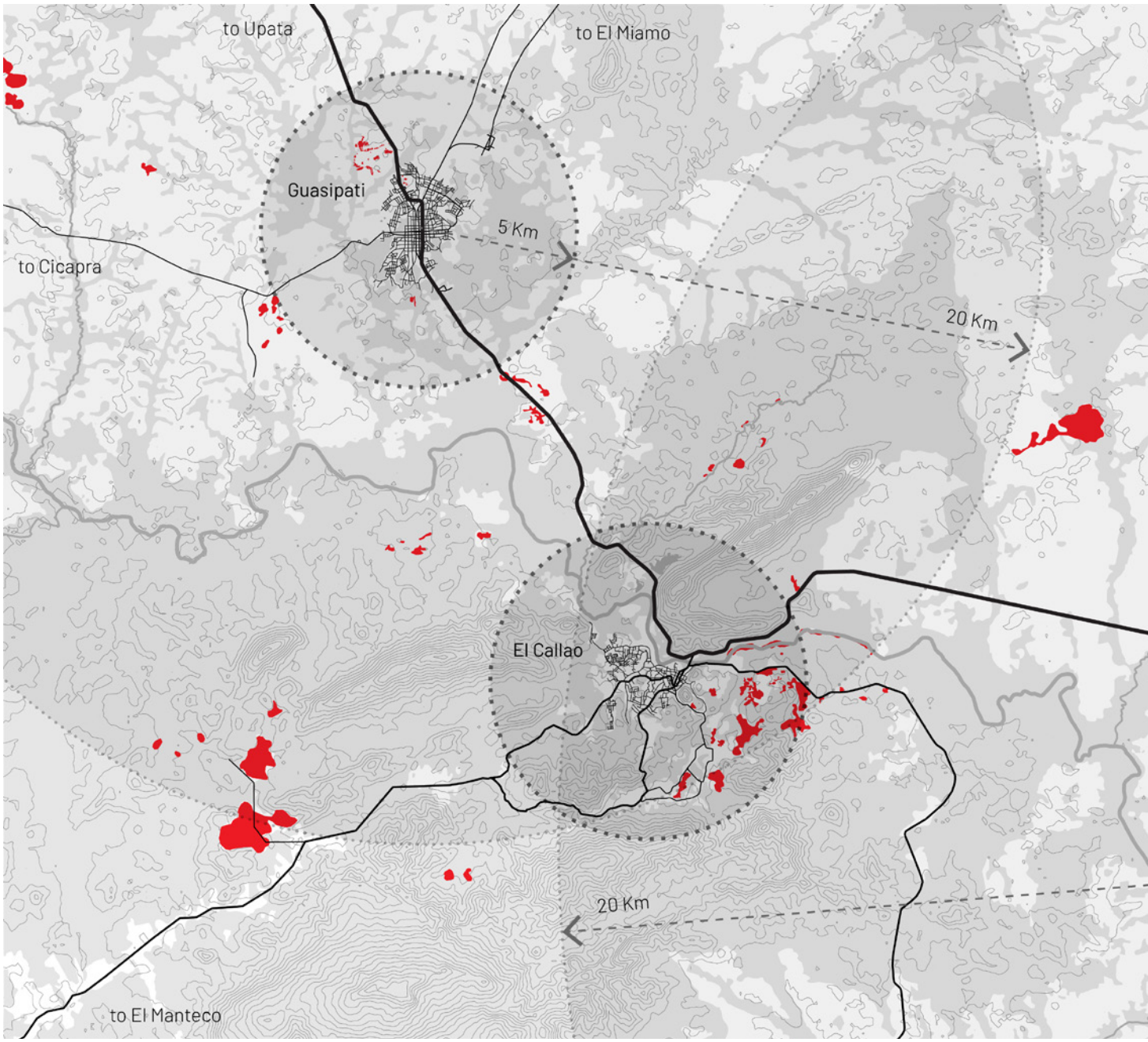
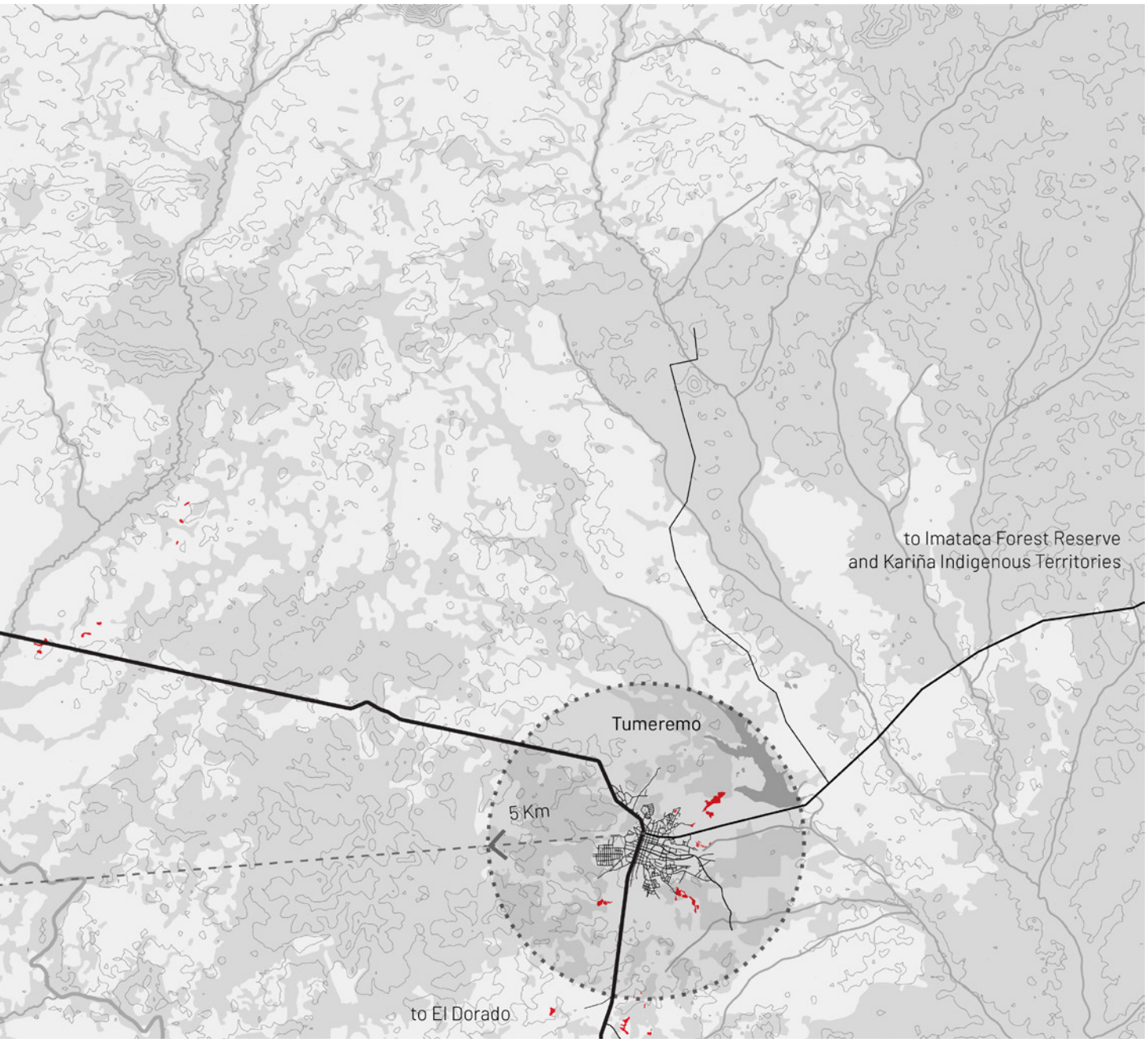


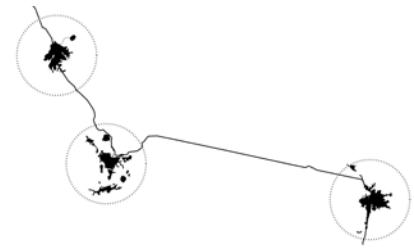
FIG. 8.12 Guasipati, El Callao and Tumeremo can be described as a set of neighbouring but spatially separate urban centres with some degree of interdependence with one another. There are 56 kilometers between Guasipati and the eastern-most town of Tumeremo. Under normal circumstances, it would take less than an hour to travel from one extreme of this linear cluster to the other along the regional trunk road. In addition, the three towns have similar populations according to the last national census. So it could be argued that no one centre is more dominant than the others. Source: made by the author.



Working with the affordances of the existing Spatial Structure

Sources: Global Forest Change; OSM; IGVSB; OpenDEM; RAISG; and data built by the author

- Tropical Moist Forests
- Savannas
- Resource Extraction Sites
- Regional Trunk Road
- Other Roads
- Waterways



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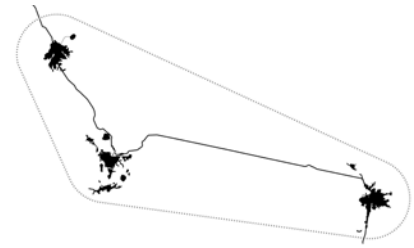

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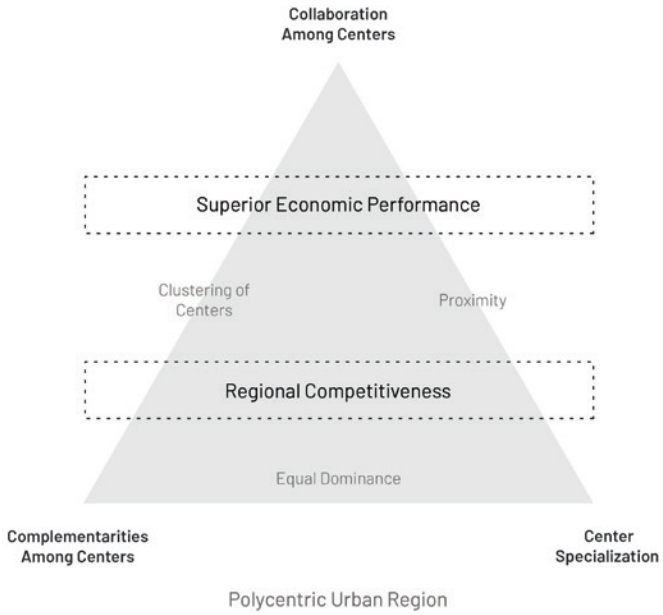

FIG. 8.13 Today, the three towns work as separate entities even though they have a certain degree of interdependence with one another. Source: made by the author.

FIG. 8.14 By taking advantage of the existing spatial conditions, and by promoting a series of strategic interventions, a polycentric urban region could be promoted. It would increase the economic performance of the cluster and facilitate the generation of new economic alternatives. Source: made by the author.

FIG. 8.15 A diagram that illustrates the spatial and non-spatial factors that determine the existence of a polycentric urban region, according to polycentricity theory. Source: made by the author.

The cluster formed by the three mining towns under consideration is significantly more populated than other peripheral areas of the Venezuelan Guayana. As shown in Figure 5.1., all of them have a permanent population of over 20,000 inhabitants, according to the last national census (INE, 2014). And even though these are already important numbers individually, the PUR model creates the possibility of thinking of a single functional area with a 'borrowed size' of more than 65,000 inhabitants, a number which represents a very favorable setting for local development. The concept of 'borrowed size', coined by William Alonso in 1973, is closely linked to the notion of population potential. In fact, Alonso considers that the latter may be used as an indicator of the former, since it represents 'an index of the opportunities for interaction with people on other places' (Alonso, 1973, p. 200). Theoretically, this greater critical mass provides the inhabitants of a cluster the advantages of living in a larger city without losing the benefits of a smaller one (Alonso, 1973). In addition, the notion of 'borrowed size' becomes a strong argument to justify strategies that could enhance the regional competitiveness and create new jobs.

But beyond demographic matters, literature on polycentricism shows that there are many other preconditions that need to be met before a given territory can be referred to as a PUR (Bailey & Turok, 2001; Parr, 2004; Urso, 2017). Some of them have to do with the travel distances that result from the morphological structure of a particular cluster, since some authors argue that there should be both a maximum and a minimum level of separation between any two points. Others have to do with functional issues, such as the level of economic interaction and the degree of interdependence among centers, but also with the presence of specialized economies that may help them foster strategies of cooperation instead of competition. Finally, literature also reveals that it is important that within a particular PUR no single center should be more dominant than the others in terms of urban population or economic importance. All the conditions outlined above are present in this peripheral part of the Venezuelan Guayana.

FIG. 8.18 Many people from Guasipati and Tumeremo go to work in the mines of El Callao on a regular basis. Photograph taken by Cheché Díaz. Retrieved from http://cronica.uno

FIG. 8.17 There is also an important floating population in this part of the region. Lack of opportunities throughout the country have pushed many to migrate to the mines of the Venezuelan Guayana. Photograph taken by Manu Quintero. Retrieved from https://www.bbc.com

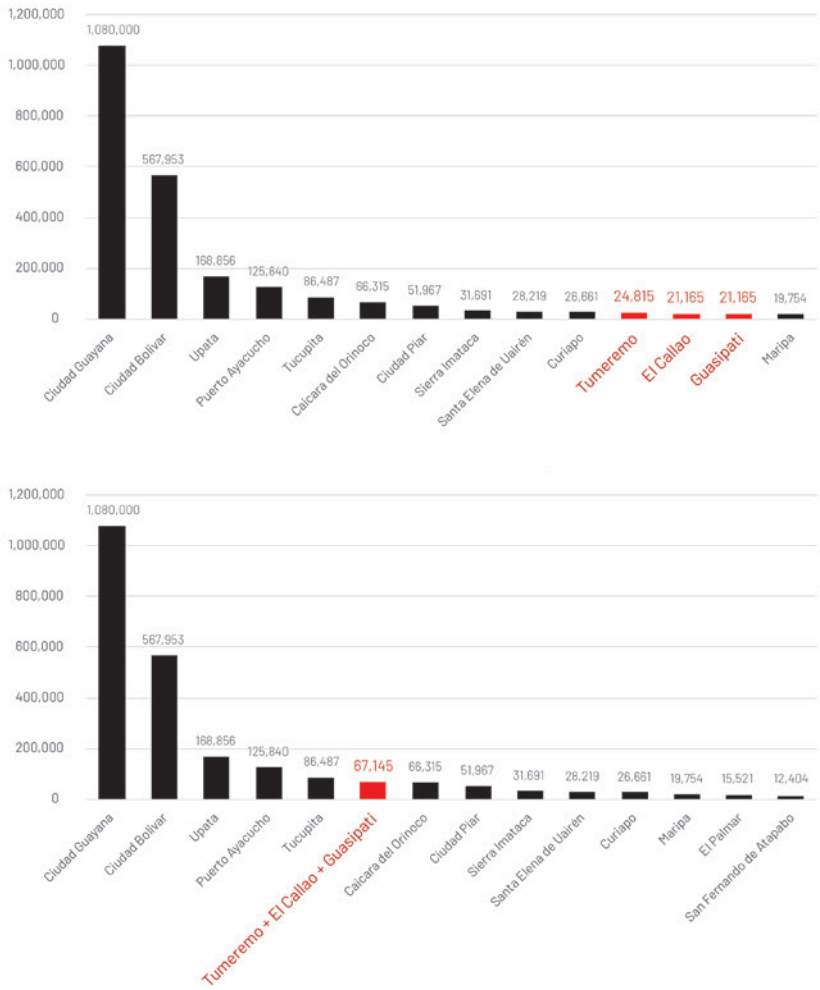

FIG. 8.16 According to the last national census, the three towns have a very similar population size. But the morphological structure of the cluster makes it possible to borrow size from one another and function as one larger city with more than 67,000 inhabitants. Source: made by the author, with data for the INE - Instituto Nacional de Estadística.

From a morphological point of view, the clustered distribution of the three mining towns under examination is arranged in a linear way along the trunk road, with large tracts of savannas, tropical moist forests and agricultural land separating the different centers from one another. Regarding the level of separation between them, the required conditions are also satisfied in this case. According to Bailey and Turok (2001), one hour's travel time should be considered as the upper limit of separation between any two given centers, although John Parr clarifies that other limits have also been employed (2004). In any case, there are 18 kilometers between Guasipati and El Callao (around 23 minutes travel time), and from there only 38 more kilometers separate this center from the eastern-most town of Tumeremo (little more than 35 minutes by car). In total, and under normal circumstances, it would take less than an hour to travel from one extreme of this linear cluster to the other along the trunk road. In the South American context, and even more in peripheral regions like the Venezuelan Guayana, such distances are not considered great nor limiting. To corroborate this assumption the author performed a series of interviews to a limited number of people that lived in any of these three towns, and the exercise revealed that the centers were always perceived to be very close between one another.

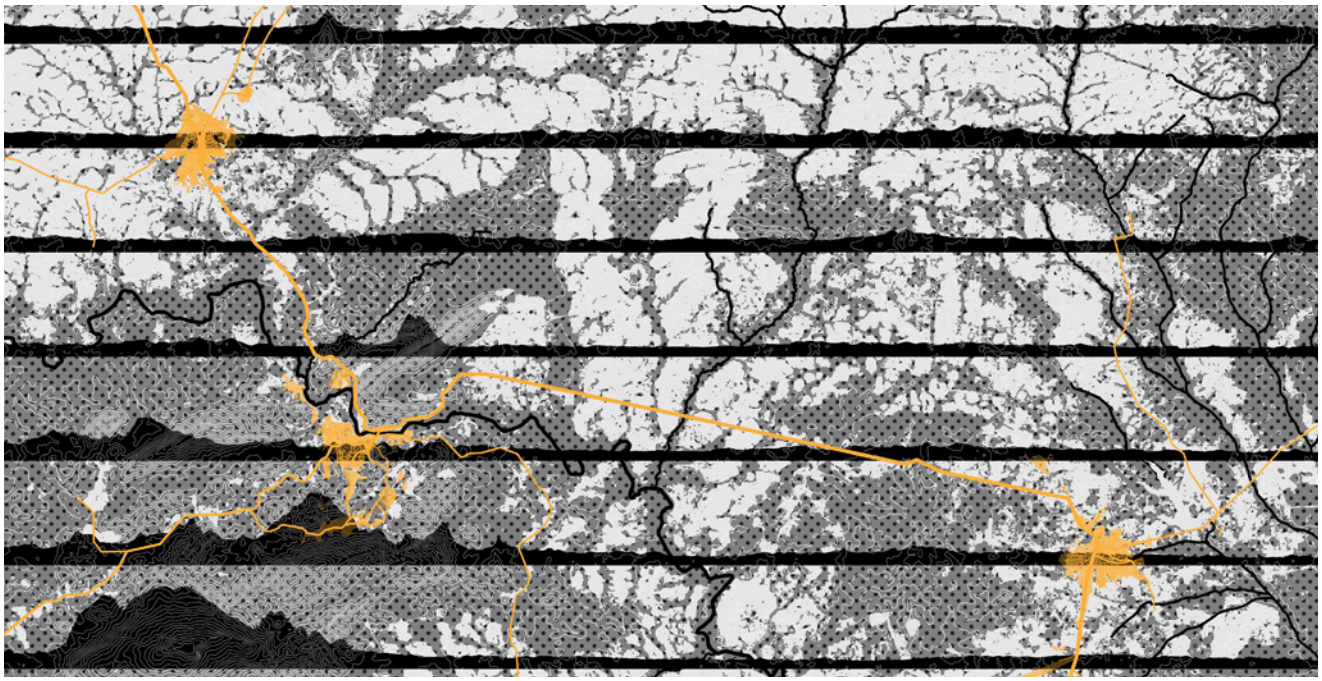

FIG. 8.19 The gold-bearing quartz veins under the hill range that surrounds El Callao have supported the extractive economy of this area since the ninetheenth century, along with the alluvial gold placers of the Imataca Forest Reserve, near Tumeremo. Source: made by the author

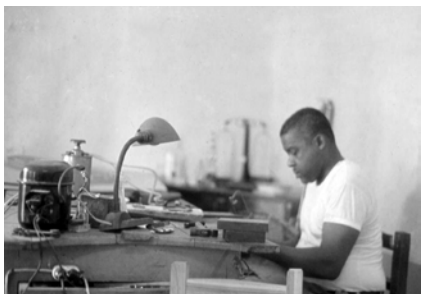

FIG. 8.20 An archive photograph of Joshua Harewood, an iconic goldsmith that lived in El Callao (Sarti, 2012). Retrieved from https://issuu.com/

From a functional point of view, the three towns interact with each other significantly even though they are separate settlements. For example, many people go on a regular basis to El Callao to work in the mines, to cash the gold they extracted somewhere else in the gold buying houses, or simply to buy valuable goods in some of the local well stocked grocery stores (García Marco, 2018). It has also been reported that miners infected with malaria go to a diagnostic center in Tumeremo for testing and medicines (PAHO/WHO, 2017), and the interviews revealed that during the weekends, it is not uncommon for some locals to travel to the cockfighting arenas of Guasipati or Tumeremo. In simple terms, the proximity and the critical mass of this region enables people to use the businesses and entertainment facilities of other cities to complement their own, and the gold-mining labor market enjoys a wider range of demand and supply.

Regarding the index of specialization of this particular cluster, its extractive vocation comes forward. Generations of gold miners have succeeded one another in El Callao since it was founded in 1854, and mining is a major part of the town's identity. But the town also managed to develop a significant goldsmithing and jewellery-making sector (Sarti, 2012), both of them activities that added value to the processed mineral and diversified the local economy. Cattle and horse breeding, along with agriculture, were particularly important in Guasipati due to its proximity to vast surfaces of grasslands. Nevertheless, a considerable part of its population always depended on the gold mines of El Callao (Vila, 1997). Gold and diamonds have also been extracted from the alluvial placers nearby Tumeremo for more than a century, but in the past the town also marketed non-timber forest products like bulletwood gum. It must be said that in the last twenty years the various centers have become very homogeneous. The rise of gold prices and the loss of value of the local currency have weakened all the other forms of economy, including goldsmithing and jewellery-making, and now all towns are heavily engaged in gold extraction.

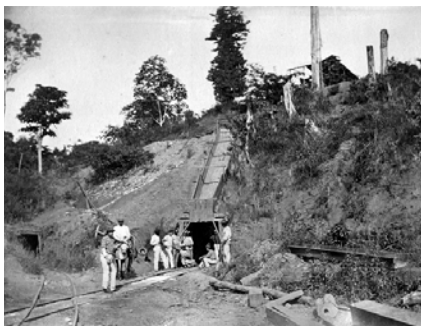

FIG. 8.21 Cockfighting is one of the most popular forms of entertainment among miners. They travel from one town to another to gamble, as this image of a cockfighting ring in Guasipati shows. Photograph taken by Henry Moncrieff. Retrieved from https://www.flickr.com

FIG. 8.22 People from all three towns, but also from the surrounding villages, travel to Tumeremo to visit the only diagnostic center where blood tests for malaria can be done. Photograph taken by Meridith Kohut. Retrieved from https://www.nytimes.com

FIG. 8.23 A gold mine in the town of El Callao, then known as Caratal, taken in 1875. Since the nineteenth century many of the inhabitants of Guasipati and Tumeremo have depended on the mines of El Callao to earn a living. Retrieved from https://earlylatinamerica.wordpress.com

Regarding the issue of what John Parr calls the 'size distribution of centres' (2004), a debate may be opened as to whether this part of the Venezuelan Guayana can be regarded as a PUR or not. According to Parr this condition is simply a demographic one, since he clearly states that in a PUR no centrality should have a population dominance over all the other (2004). If this is the case, this condition can be satisfied since Guasipati, El Callao and Tumeremo have very similar populations according to the last national census (INE, 2014), as it has been already mentioned above. But it must be mentioned that these numbers are not a snapshot of the current reality, since the national economic crisis and the lack of employment opportunities throughout the country have pushed many Venezuelans to abandon their homes and migrate to the mines of the Venezuelan Guayana (García Marco, 2018; Ebus, 2018). It is safe to imagine that most of the migrant workers in this area are living close to the gold placers that lie in the Imataca Forest Reserve, near Tumeremo, or near the hills around El Callao. In other words, it is possible that nowadays the gold mining hotspots attract an important floating population that is creating a demographic imbalance that did not exist before, making some centers more dominant over others.

But Bailey and Turok have a different opinion regarding this issue (2001). They also agree that no one center should be more dominant that the others within a PUR, but they do not limit the problem to demographic issues alone. Economic importance and even status also play an important role when it comes to determine if an urban center is a dominant one. If this is the case, then the apparent homogeneity of the three centers under consideration will start to take on shades of grey. Even though Guasipati and Tumeremo are older towns, with origins that tie them to the foundation of Capuchin missions during the eighteenth century, the economic importance of El Callao outweighed them as soon as the settlement was established, simply because of the large presence of gold-bearing quartz veins underneath the surrounding hills.

American, European and Venezuelan mining companies were given gold mining concessions by the national government from 1854 onwards, and specialized workers were brought from the Antilles to extract the mineral from vertical shafts and underground galleries. This foreign migration that came from the nearby British and French colonies, combined with the local culture, created a rich and distinct identity in El Callao that is uniquely its own. Calypso music and the Carnival of El Callao, inscribed in 2016 on the UNESCO list of the Intangible Cultural Heritage of Humanity (ICH-UNESCO, 2016), embody the diverse heritage of this particular town. One that distinguished it from the other neighboring centers in terms of culture, race, religion, music and even gastronomy, and that is still very present to this day. Together, both the booming economy that derived from the extraction of gold and the cultural diversity brought by immigrants from the Caribbean islands, gave El Callao a more dominant role among the three urban centers for more than a century. But the national economic crisis and the rise of illegal gold mining throughout the Venezuelan Guayana have made this distinction a blurry one today.

It is clear that most, if not all of the conditions set out in polycentrism literature to understand if a cluster of centers can be regarded as a PUR, are present in this part of the Venezuelan Guayana. But it must be said that the level of interaction between the centers, which is undoubtedly facilitated by the spatial structure of the cluster

‘Being a Madama is not a disguise, it’s part of our heritage, something we must do, and all women are madamas, and we are madamas not because we dress in carnivals, but because we were born in El Callao’

[Nivis Yraima López • El Callao, Bolívar]

Stories of Traditions

Nivis López was born in El Callao, and she has participated in the carnivals since childhood. She went with her mother to the parades and danced together to the rythm of Calypso music. The first time she disguised herself in a costume she was 12 years old, more than 47 years ago. As she grew up she became a singer in one of the most important Calypso bands of El Callao, and later also a trainer of young girls. ‘The important thing is to safeguard our traditions’, she explains. Two of her brothers are musicians during the carnivals, and a sister works as a costume maker. When the carnival was inscribed on the UNESCO list of the Intangible Cultural Heritage of Humanity in 2016, she could not have been more proud (“La Madama, un estilo de vida del carnaval venezolano de El Callao”, 2017).

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes. Some of the photographs that accompany the microstories come from the same source, but this was not possible in all cases. The idea is to give a picture of how people live in peripheral and remote areas of the Venezuelan Guayana.

La Madama, un estilo de vida del carnaval venezolano de El Callao. (2017, February 27). Retrieved from https://mundo.sputniknews.com

FIG. 8.24 The queen of the carnival while being crowned by The Same People, one of the most important calypso bands of El Callao. Photograph taken by Miguel García Moya. Retrieved from https://miguelgarciamoya.blogspot.com

FIG. 8.25 The diversity brought by immigrants from the Antilles, combined with the local culture, created a rich and distinct identity in El Callao that is embodied in its carnival and Calypso music. Photograph taken by Miguel García Moya. Retrieved from https://miguelgarciamoya.blogspot.com

FIG. 8.26 Acrá, a famous fried dish from El Callao that has its origins in the cuisine of the French Antilles, made with codfish, parsley and chives. Photograph taken by Karla Herrera Wulff. Retrieved from http://elestimulo.com

FIG. 8.27 A group of proud "madamas" dancing in a parade during the famous Carnival of El Callao. Photograph taken by Juan Barreto. Retrieved from https://www.lapatilla.com

and its population potential, is also stimulated by the general lack of quality services among them. If the three towns are to become one functional entity, the PUR needs to be activated and fostered with spatial interventions, particular infrastructures, policies and incentives, so as to create even more favorable conditions that could influence on subsequent economic growth (Parr, 2004). Indeed, the accumulated advantages that the cluster has make it a very attractive location for a range of new economic activities in the region, helping it to overcome its current dependence on resource extraction.

A health warning must be made regarding the difficulty of transposing models and solutions from one place to another, since the polycentric urban region is essentially a European concept. Although similar strategies based on polycentrism are currently being employed in Italy to trigger local development processes in remote rural peripheries (Urso, 2016), there are great differences between the Italian and the Venezuelan contexts. The indicators used to determine what is peripheral were probably very different in the Italian 'National Strategy for Inner Areas' (SNAI). Distances between remote settlements and urban centralities are considerably shorter in Italy than those of the Venezuelan Guayana; the quality of the health and educational facilities are also very dissimilar; and ultimately, the national economy of Italy is much stronger than its Venezuelan equivalent. Nevertheless, many scholars argue that the PUR is more of a hypothesis than an established concept (Purr, 2004), and as such it needs further testing and explorations. In any case, the PUR should be seen as a potentially useful model to stimulate endogenous development and economic growth in the most peripheral areas of the Venezuelan Guayana. In a region where the wellbeing of its population and the fragility of the forests are being threatened by extreme dependence on resource extraction, to turn urban could provide an interesting path for a more sustainable future.

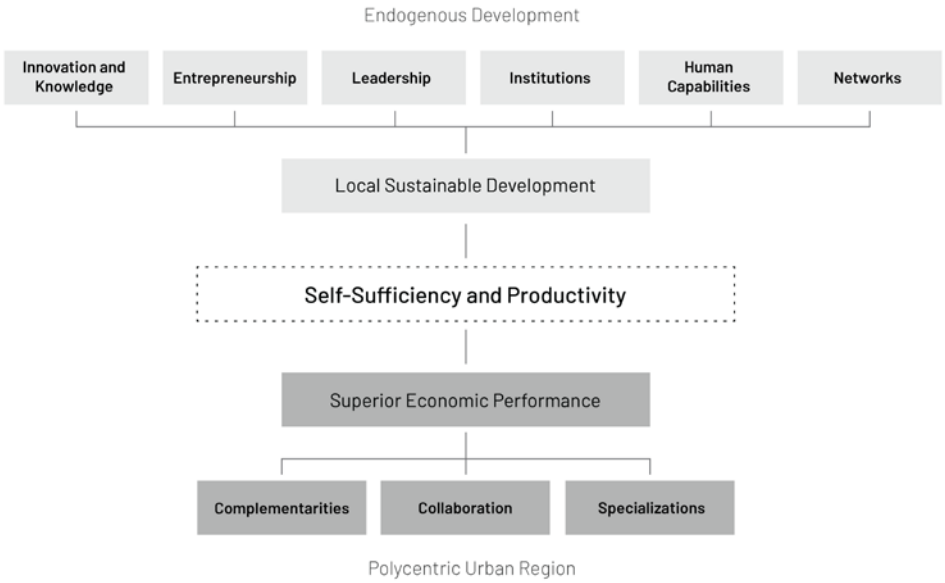

FIG. 8.28 Diagram that illustrates the key principles of the theretical framework to transfer theory to design. Source: made by the author.

8.2 – **Operationalizing Theory to Manage Change**

Local development in a peripheral polycentric urban region

A transfer needs to be made to operationalize the theory on endogenous growth and polycentricity in this part of the Venezuelan Guayana. By doing this, the combination of principles from those bodies of knowledge will acquire a territorial dimension in a very specific and challenging place. Endogenous growth theory stresses the importance of a wide range of factors that, together, are able to stimulate local sustainable development. These factors include accessibility to innovation and knowledge, leadership, local entrepreneurship, the existence of strong and flexible institutions, human capabilities, and the capacity to work with network structures (Stimson & Stough, 2008; Vázquez-Barquero & Rodríguez-Cohard, 2017). On the other hand, theory on polycentricity highlights a variety of spatial and non-spatial factors. As evidenced above, most of the spatial conditions that are necessary to regard a cluster of centres as a PUR are present in the area that has been selected as a case study for this research. Therefore, what needs to be strengthened through design are those non-spatial factors that theory emphasizes, and which are particularly weak or even absent in this part of the region. Those factors are the existence of functional complementarities among centres, their capacity to collaborate and work as one single entity, and the presence of specialized economies (Bailey & Turok, 2001; Parr, 2004). If these factors are strengthened and paired with the benefits provided by the existing morphological structure, the cluster of towns will achieve a superior economic performance. In a nutshell, a spatial strategy founded on polycentricity and endogenous growth theory, aimed at facilitating the reinforcement of the above-mentioned factors, can increase the productivity and self-sufficiency of a peripheral territory. This finding has a great value, since it provides a useful model to minimize the exposure of communities in resource-rich regions to external factors while improving their living conditions.

Even though this strategy deals with plenty of economic aspects, its territorial implications are undeniable. In the transfer from theory to design, the spatial dimension of the strategy is evidenced by joining together in very particular, physical, and strategic places the different relations that exist between nature, resources, economy, mobility, infrastructure, human capacities, financial investments and existing urban conditions. As Saskia Sassen has thoroughly stated, all human and economic activities take place in space in one way or another (Sassen, 2002). Spatial planning becomes extremely relevant once parties understand that the outcomes of an economic strategy are not the same when space is not taken into consideration. If the projects and interventions are made in places that are difficult to reach, their impact on the creation of new alternatives will probably be inefficient. Special consideration must therefore be given to connectivity and mobility, since the benefits that will be brought by some interventions must be accessible to all. Otherwise, efforts and resources might be lost even if the intentions were good. Also, to activate the PUR and to enhance its regional competitiveness, it is crucial to promote the interdependence of the three towns in a strategic way, so that no center becomes more important than the others. For this reason, the development of specialized but complementary activities should be stimulated in each town, instead of duplicating efforts and homogenizing their economies.

Those specialized economies should be linked to the specific potentials of the different environments, since each town has particular assets that make them more attractive than the others for the development of certain activities. All of them are located just outside the limits of the Imataca Forest Reserve, an extremely large protected natural area that allows the sustainable and productive management of its natural resources for consumption and industrial purposes (González Rivas, Malaver & Naveda Sosa, 2015). Nevertheless, Tumeremo has better accessibility to the reserve than the other two urban centres, with a road that stretches for more than a hundred kilometers through the forest and Kariña indigenous territories to the village of Bochinche, next to the border with Guyana. In Tumeremo there is also a small university run by Fundación La Salle, called the Frontier Campus, which offers specialized education that caters to the agroindustrial and mining sectors. According to an official document elaborated for the Ministry of Environment and Natural Resources in 2003, that same foundation had applied for a concession in the forest reserve to conduct experimental research on silvicultural techniques (GFW, 2002; Berroterán, 2003). For all these reasons, Tumeremo stands as a particularly attractive location for the development of a Research and Development cluster that will contribute to the diffusion of innovation and knowledge throughout the PUR.

The Antillean traditions of El Callao, with the unique Venezuelan flavor that Calypso music has acquired in this town, and recently reinforced with the recognition of its Carnival as part of the immaterial cultural heritage of the world by UNESCO, make this town a desirable place for the development of cultural projects. These interventions will be aimed to strengthen tourism and artistic initiatives in the PUR, but also to support the local manufacturers of costumes, masks, and musical instruments that have maintained these traditions over time. In combination with the important cultural assets of El Callao, its proximity to vast savannas, the surrounding forested hills and the presence of the Yuruarí River open windows of opportunity for other types of tourism related to nature.

‘Here in El Callao there is no carnival without Calypso, and this rhythm is the greatest thing we have, because we use it to share and celebrate traditions; we use the Calypso in our everyday lifes and tell our stories through it’

[Carlos London • El Callao, Bolívar]

Stories of Traditions

Carlos London is part of the committee responsible of organizing the carnivals in El Callao. ‘We would like to maintain our Afro-Antillean roots and what our ancestors have created for us here ‘, he says. An important part of that heritage is Calypso music, which he has played for more than 40 years. The rythm came from Trinidad and Tobago, but in El Callao it acquired a distinctive character in combination with local instruments. London explained that this genre is not only a musical expression for the residents of El Callao, but a deep-rooted philosophy that allows them to have a better understanding of the mixture of heritage that different cultures contributed over time. (“Carnaval de El Callao, una tradición venezolana que perdura en el tiempo”, 2017).

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes. Some of the photographs that accompany the microstories come from the same source, but this was not possible in all cases. The idea is to give a picture of how people live in peripheral and remote areas of the Venezuelan Guayana.

Carnaval de El Callao, una tradición venezolana que perdura en el tiempo. (2017, February 28). Retrieved from https://mundo.sputniknews.com

FIG. 8.29 A musician in El Callao, playing calypso during the carnivals. On the background, the billboard of a liquor store called ‘The Miner’. Photograph taken by Miguel García Moya. Retrieved from https://miguelgarciamoya.blogspot.com

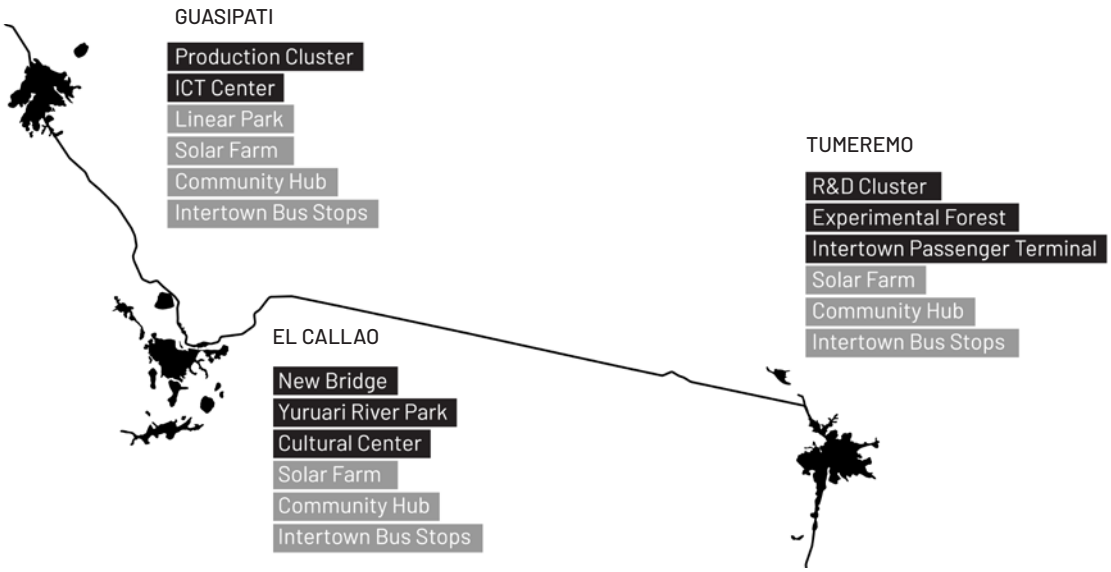

FIG. 8.30 Tools and interventions for the activation of a productive and self-sufficient polycentric urban city. The promotion of specialized but complementary projects in each town will stimulate synergies and interdependence. Source: made by the author.

Both Guasipati and Tumeremo have relatively important air strips that connect them to the rest of the country, but the geographical location of Guasipati also helps to shorten the distances between the PUR and the large cities of the north by road. For this reason, this town becomes an attractive location for the promotion of new industrial spaces to process and add value to the non-timber forest products that could be harvested from the Imataca Forest Reserve. The fruitful synergies that can easily be promoted between this project and the R&D cluster of Tumeremo are obvious and a good example of how specialized and complimentary economies could be activated in the PUR. But in truth, all these activities will benefit from the others in multiple ways. Ecotourism will benefit from the upgrade of the airport terminal in Guasipati, because the increase of flights to transport cargo from the new manufacturing industries could also bring an increase in visitors. It will also take advantage of the activities carried forward by the R&D cluster, since it will create a safe and stable environment in the forest reserve for different forms of wildlife and botanical tourism with the support of Kariña indigenous groups.

But before describing in detail the different projects and interventions envisioned in the strategy, aimed at activating a polycentric urban region in this part of the Venezuelan Guayana, it is important to mention that all are framed by the general vision for the entire region. Together they contribute to achieve the main goals of the regional strategy, which seek to promote new economic activities, facilitate the growth of local initiatives, and improve the spatial and environmental conditions in remote and peripheral areas. Indeed, the range of tools and interventions that are being proposed deal with problems of mobility and connectivity between the three urban centres; with the building of capacities and capabilities among local communities; with the diffusion of technology, innovation and knowledge throughout the territory; with the promotion of clusters with a smart specialization approach; with punctual interventions aimed at enhancing the living conditions of the three towns; and with the production of clean and renewable forms of energy to cater the demand of the new activities that will emerge. These different projects, and the interlinks between them, will be analysed in the following pages.

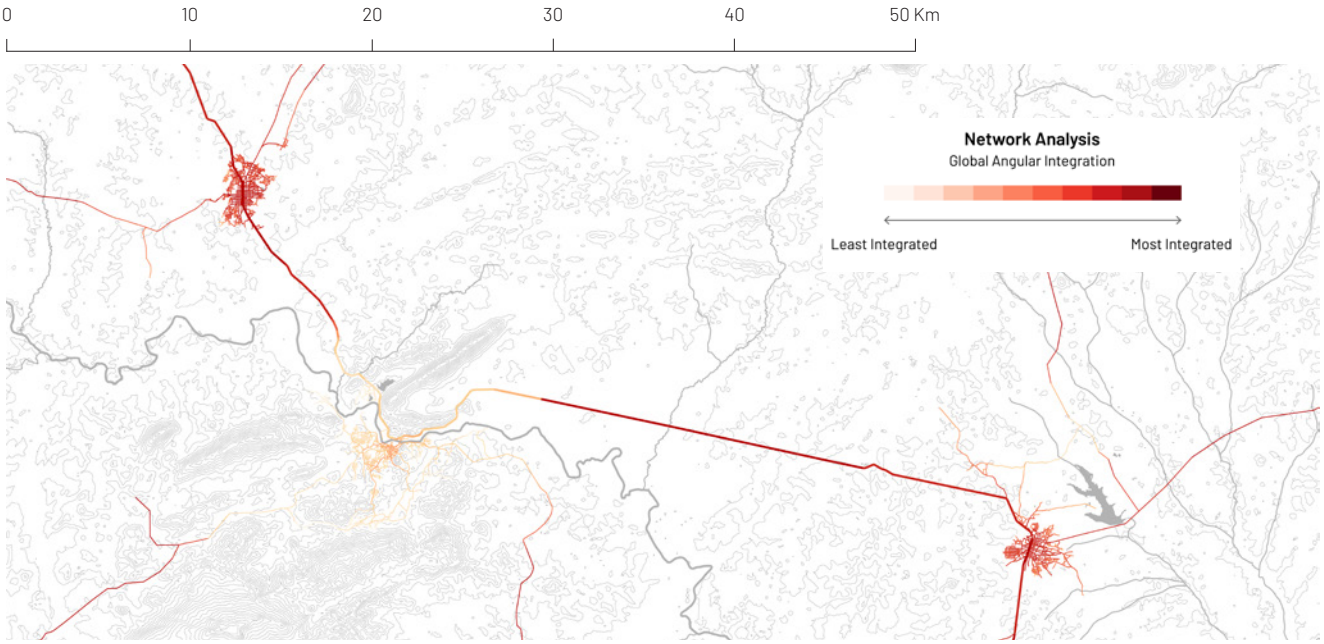

FIG. 8.31 Global angular analysis of the cluster of towns, made with the Place Syntax Tool plugin for QGIS. The analysis reveals the poor level of integration of El Callao in relation to the road network, from a systemic point of view. Source: made by the author.

8.2.1 – **Common Intertown Transport System**

A global network analysis of the cluster of towns showed that El Callao is less integrated to the larger system than the other two towns. There are two factors that contribute to this issue. First, Guasipati and Tumeremo have a grid structure from colonial times that is crossed by the regional trunk road in its entirety. Second, the town of El Callao is located south of the Yuruarí River, while the trunk road stretches on the other side. Only one bridge crosses the waterway and connects El Callao with the main road, a spatial condition that explains its lower degree of integration to the larger system when compared to the other towns. If a common public transport system is to be promoted, so as to increase the accessibility of local communities to the new economies that will be generated in the other towns, this situation must be taken into consideration to avoid a funnel effect around the bridge in the future.

Other problems were found at the local level. In Tumeremo and Guasipati, the main passenger terminals are located in inconvenient places that reduce accessibility of people to the intertown bus service. Both terminals have been built in segregated areas with very low densities at the edge of the towns. Even if a catchment area with an 800 meters radius is calculated from the existing bus terminals, the town centres cannot be reached by foot. This is particularly true in Guasipati, but a better example of how accessibility can limit the possibilities of communities to self-betterment can be made in Tumeremo. There, the existing Frontier Campus is located on the outskirts of the town and very far away from the main passenger terminal. If a young student from Guasipati plans to earn a degree from that institution, he will be forced to travel there with a private car or take two different public transport systems. The frequency and the availability of those journeys are unknown, but the example serves to illustrate how the impact of a project depends on spatial factors. In El Callao the situation is somewhat better, since the main terminal is located near the bridge and close to the dense historic center. But it could be said that from a larger perspective, the catchment area is still very limited.

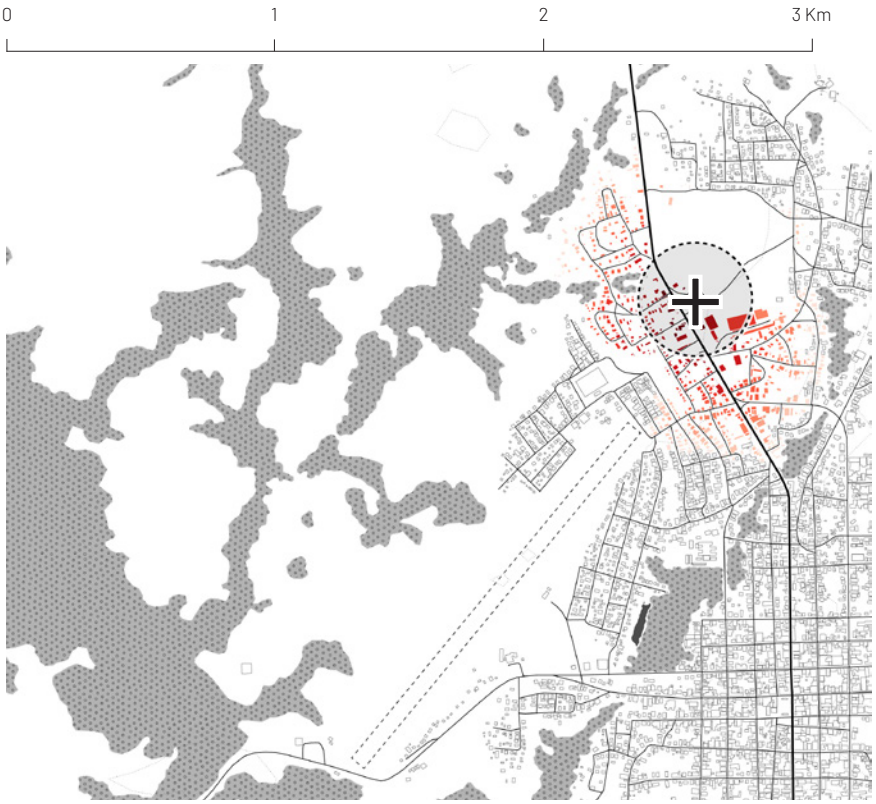

FIG. 8.32 The reach of the main passenger terminal in Guasipati today. The catchment area was calculated by setting a reasonable walking-distance with an 800 meter radius from the existing building. Source: made by the author.

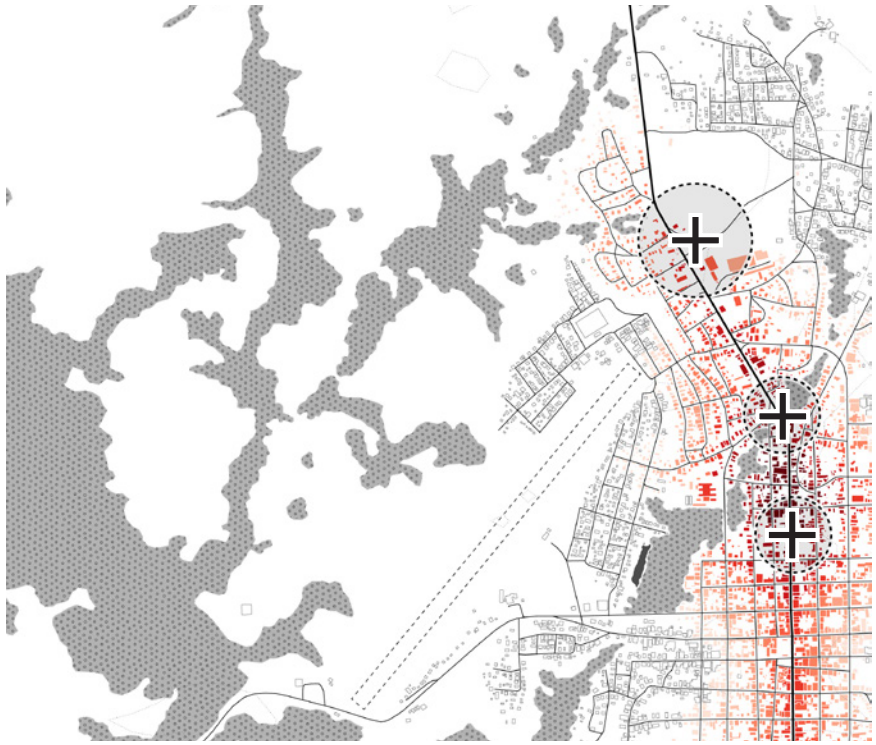

FIG. 8.33 The extended service area that the common transport system could have in Guasipati with only three additional bus stops along the trunk road. The reach was calculated by setting an 800 meter radius walking-distnace from the existing passenger terminal and the additional stops. Source: made by the author.

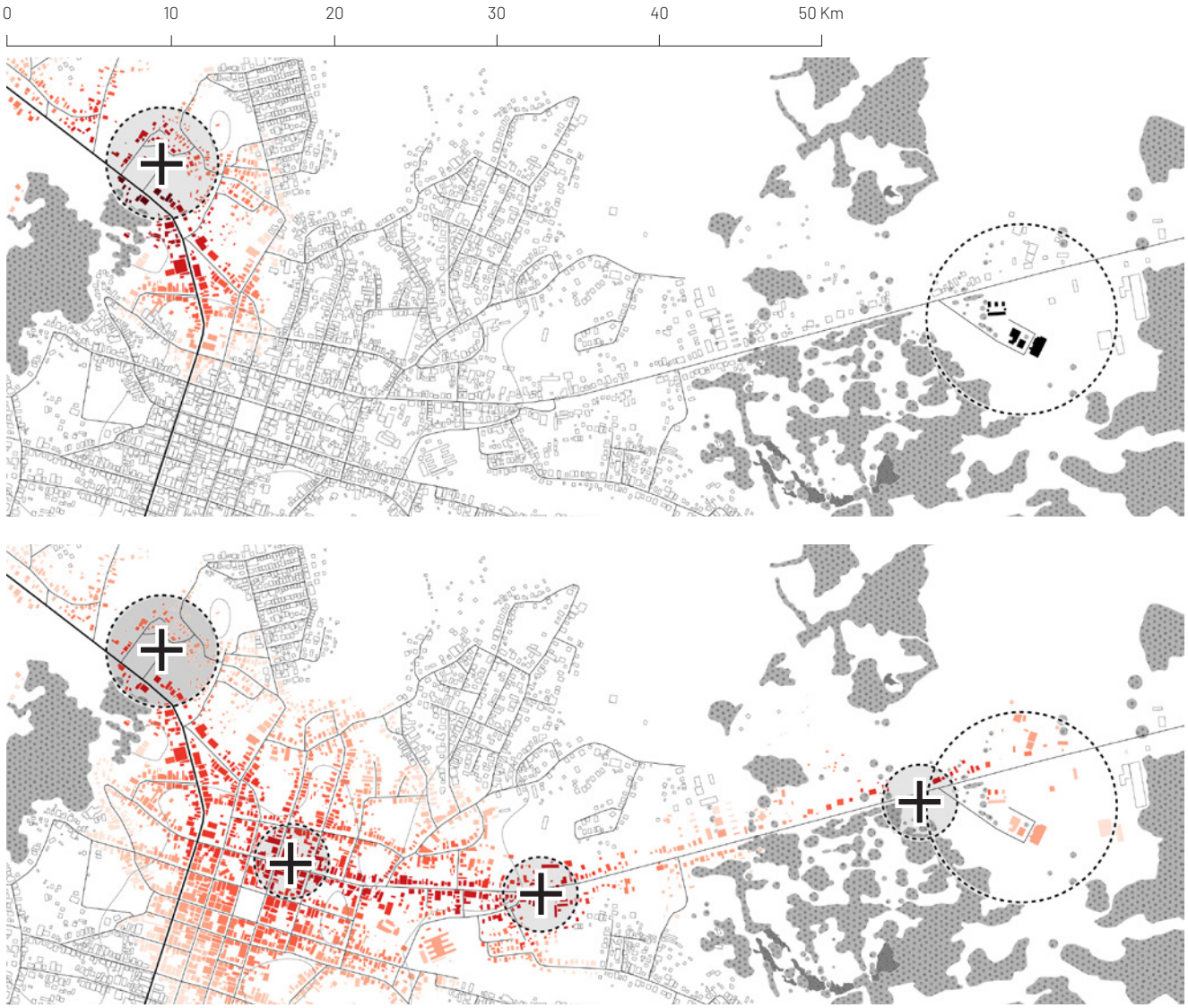

FIG. 8.34 The reach of the main passenger terminal of Tumeremo today, using an 800 meter radius walking distance. Source: made by the author.

FIG. 8.35 The reach of the common transport system, with three additional stops between the main station and the Frontier Campus in the east. Source: made by the author.

Accessibility could be improved with the creation of a common transport system, making opportunities more reachable to all three towns. The number of stops along the journey is important to increase the catchment area of the transport system. By adding 3 additional bus stops along the trunk road in Guasipati, most of the town center could reach the transport system within walking-distance. The same number of stops could be added to the road that stretches to the Frontier Campus to increase the service area of the transport system in Tumeremo. The existence of one single bridge to enter El Callao constraints accessibility in this town. Once it has been crossed, buses would need to make a loop around the town to create a larger service area. This solution will create conflicts with the local transport sindicates, and for this reason the creation of a second bridge is envisioned in a second phase. With this intervention the trunk road could be bypassed, avoiding the loop and allowing the intertown transport system to enter through one bridge and exit through the other. With a few additional stops, the catchment area of the common transport system will be enhanced, and a commercial high street will be created.

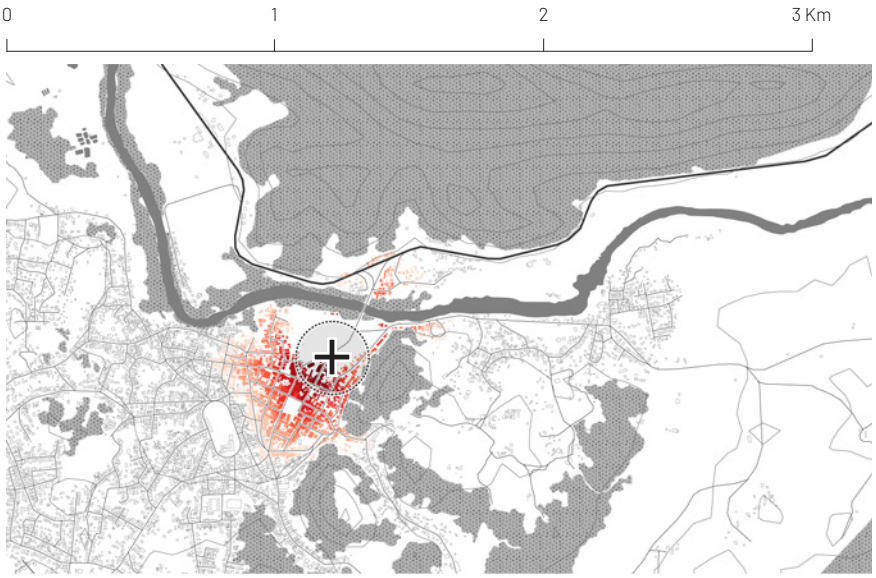

FIG. 8.36 The reach of the main passenger terminal of El Callao today, using an 800 meter radius catchment area from the station. Only the historic town center has access to the intertown transport system within a reasonable walking distance. Source: made by the author.

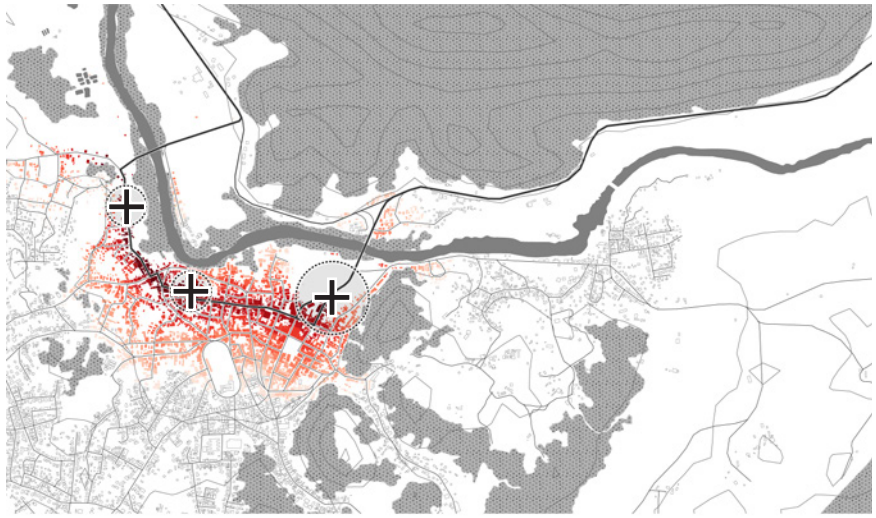

FIG. 8.38 The extended reach that the intertown transport system could have in El Callao, with an additional bridge over the Yuruarí River that would bypass the trunk road, and with three additional stops between the bridge and the existing station. A high street would be created parallel to the river. Source: made by the author.

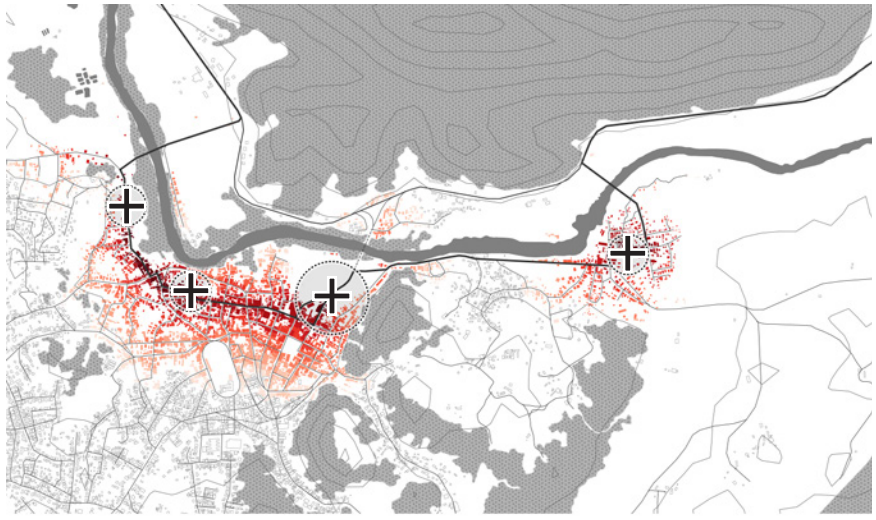

FIG. 8.37 In a third phase, and only if considered necessary, a third bridge could be built over the Yuruarí River to consolidate the mining settlement of Nacupay in the east, facilitating the integration of the community to other forms of economy. Source: made by the author.

FIG. 8.39 A vision for El Callao, in which a system of community hubs and a Cultural Center in strategic and accessible locations along a River Park, will contribute to building human capacities and facilitating conditions for the development of local initiatives. Source: made by the author.

FIG. 8.40 An axonometric view of how the community hub of El Callao could look like, integrated to the surounding fabric and the proposed River Park. Source: made by the author.

8.2.2 – **Capacity Building in Local Communities**

To build human capacities and capabilities, a system of small community hubs is envisioned. There, people will have access to technical support in a wide range of topics, aimed at enhancing the entrepreneurial environment of the PUR. This is a fundamental part of the strategy, since these are the programmes that facilitate the development of local initiatives in the long-run. The community hubs should be located inside the catchment area of the common intertown transport system, so as to ensure easy accessibility to all within a reasonable walking distance from the bus station. Existing educational facilities will be given a priority to host these capacity building programmes, and for this reason they need to be upgraded and expanded if necessary. The promotion of startups should also count with the support of a business incubator, which could be allocated in the mixed-use live/work environment that is being proposed in Guasipati, and which will be further explained later in this report. The business incubator will help in the creation of network structures with stakeholders at regional, national and international levels.

The construction of a Cultural Center in El Callao will play an important role in the diffusion of local values, traditions and knowledge within the PUR. As mentioned above, the origins of El Callao link this peripheral town to the Caribbean, a historical condition that has given place to a unique cultural heritage; but Guasipati and Tumeremo, founded by Capuchin friars in the eighteen century, have cultural backgrounds of their own that relate them to the indigenous peoples that inhabit the surrounding territories. The diffusion of indigenous worldviews and traditions could be stimulated by this cultural center, creating a link between the PUR and the remote indigenous communities that live inside the forest reserve. The new center will also facilitate conditions for cultural studies and for the production of new music and creative activities, promoting the creation of new activities that go beyond the potential of the forest.

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FIG. 8.41 Tiuna El Fuerte Cultural Park in Caracas, Venezuela. The project promotes the development of art collectives by facilitating conditions for new initiatives. It provides access to information centers, auditoriums, multipurpose rooms, community radios, record factories, dance studios, and a video library. Retrieved from https://albaciudad.org/

FIG. 8.42 School in Chuquibambilla, Perú. This educational facility was built for a small community in the middle of the Peruvian jungle. The building is more than just a place of education during school hours, and seeks to be a place of development and exchange for the whole community. Retrieved from https://www.archdaily.com

FIG. 8.43 Cassia Coop Training Centre in Sungai Penuh, Indonesia. This sustainable cinnamon school for local farmers and workers seeks to set a new standard in how to run a functioning social enterprise. Here, the community will have access to a series of social benefits, in addition to training and education. Retrieved from https://www.archdaily.com

FIG. 8.44 Community Center in San Vicente, Colombia. This educational park belongs to a network of small-scale public buildings promoted by the Government of Antioquia. The program aims to build capacities in local teachers and to improve the accessibility of the communty to science and technology. Rretrieved from http://www.planbarq.com/

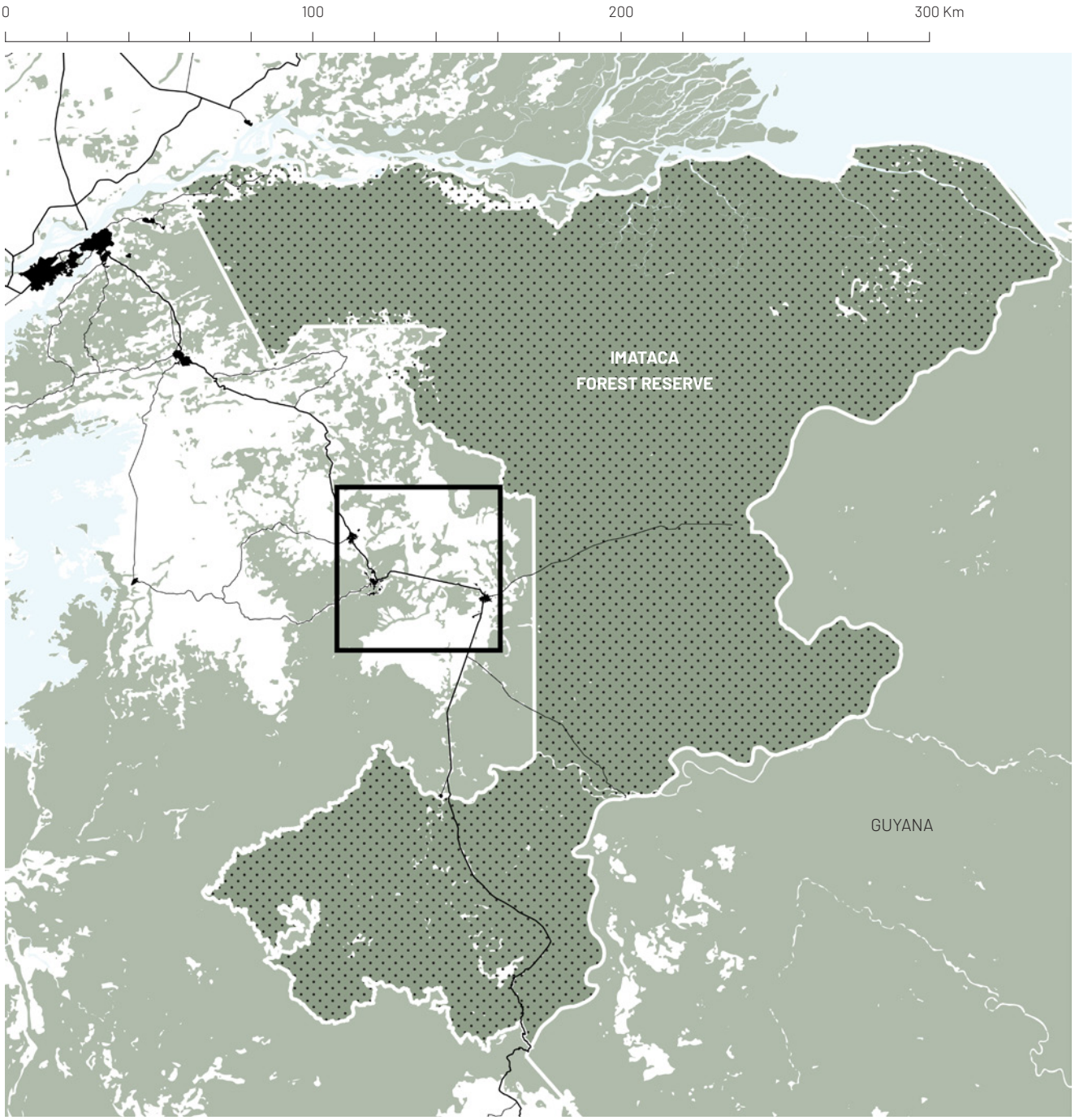


FIG. 8.45 The Imataca Forest Reserve is an extremely large natural protected area of the Venezuelan Guayana, with more than 37,500 square kilometers of tropical moist forests. The proximity of the cluster of towns to this area offers great opportunities for local sustainable development, based on the harvesting of non-timber forest products and different forms of ecotourism. Source: made by the author with data provided by Provita; Open Street Maps; Hansen/UMD/ Google/USGS/NASA.

FIG. 8.46 The IUTEMAR Frontier Campus of Tumeremo, founded by Fundación La Salle in 1999 over 25 hectares of land donated by the Sifontes Municipality, offers carrers to the community that cater the agroindustrial and mining sectors. Retrieved from https://www.lasallenorandino.org

FIG. 8.47 An example of a degraded grassland in Rio de Janeiro, on its way of being transformed into a productive Amazonian-Atlantic rainforest by makinguse of agroforestry techniques. Retrieved from https://lifeinsyntropy.org

FIG. 8.48 The regenerative analog agroforestry model developed by Ernst Götsch in Brazil has managed to restore large extensions of degraded land in Brazil. His experimental techniques are able to transform soils with low nutrient content into productive and diverse forests in a relatively short time span. Retrieved from https://medium.com/

8.2.3 – **Diffusion of Technology, Innovation and Knowledge**

For a number of reasons mentioned above, Tumeremo is the most attractive location for the development of a Research and Development cluster within the PUR. A conglomeration of universities and research centers interested in the production of new information on tropical forests could be attracted to the existing Frontier Campus, contributing greatly to the diffusion of innovation and knowledge throughout the region. Specialized education on a wide range of fields, such as sustainable forest management, agroforestry, silviculture, soil remediation, permaculture, and ecotourism, could be promoted in this cluster and provide new skills to local communities. The proximity of the Imataca Forest Reserve, with more than 37,500 square kilometers of rich biodiversity, facilitates the conduction of on-the-ground experimental research and becomes an important asset to lure researches from all over the country and beyond. The existing infrastructure, built by Fundación La Salle in 1999, should be upgraded and provided with new technology. Over time and depending on the requirements of the different academic institutions and researchers, the campus could also be expanded around the existing buildings. A mixed-use environment, where researches and students could live in close proximity to the campus, will stimulate the diffusion of knowledge and ideas outside the classrooms. Therefore, the construction of residences and other programs aimed at improving the living conditions of the campus should be built around the educational facilities.

The creation of an experimental forest is also an important part of the R&D cluster. As stated, the concession given to the cluster inside the Imataca Forest Reserve becomes the ground for the harvesting of non-timber forest products with high market value. With the support of local civil society organizations, in charge of the collection of the NTFP, the unrealized potential of tropical forests to support local sustainable development will be unleashed. But the remediation of degraded soils should also become an important task of the R&D cluster. Inside and around the 25 hectares of the Frontier Campus, there are plenty of deforested areas and extractive wastelands polluted with mercury. Those areas could become testbeds for the experimentation of permaculture and agroforestry techniques aimed at enhancing the productivity of degraded soils with low nutrient content, for the creation of constructed wetlands to clean polluted waters, and for ecological restoration purposes on deforested areas taking from the experience of Ernst Götsch in Brazil (Goetsch, 1992; Vivan, 1998; Vaz, 2000).

As stated, the Frontier Campus also needs to become easily accessible to the inhabitants of all three towns, and for this reason the creation of a bus terminal near the cluster becomes necessary. This station would be the terminus of the intertown transport system, and together with the R&D cluster it will probably stimulate urban growth around the main road. This needs to be taken into consideration in the future, so as to guarantee the spatial quality of the area. But the associated increase in demand for energy should also be considered. To cater that demand, but also to guarantee the self-sufficiency of the development and the success of the strategy in the long-run, the production of clean and renewable energy with a decentralized approach should be taken. The case of the Elizabeth Mine Superfund Site in Vermont could serve as a good example of how extractive wastelands could be used as solar farms after a cleanup process (EPA, 2018).

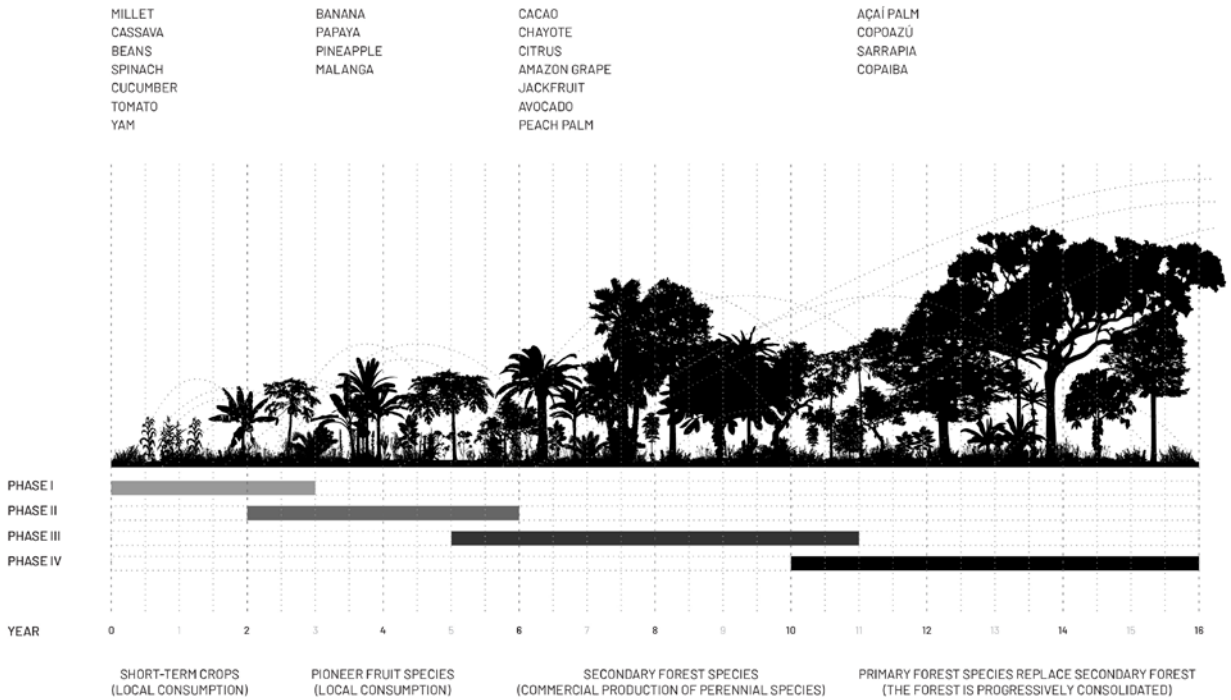
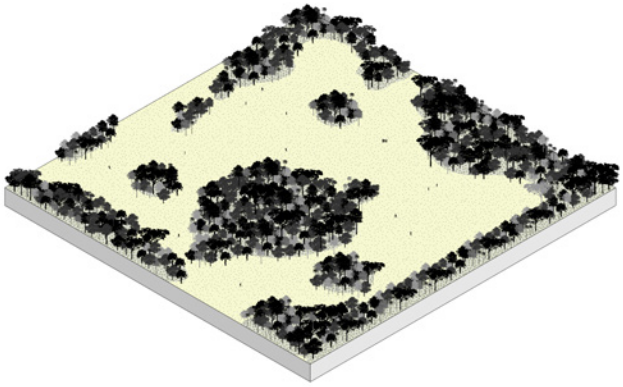


FIG. 8.49 Diagram that illustrates a natural succession of plant consortiums in an analog agroforestry system, taking from the experience of Ernst Götsch in Brazil. Source: made by the author, adapted from Vivan, 1998.

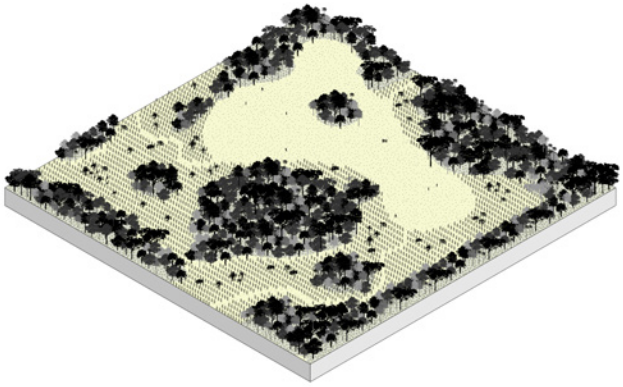
A Testbed for Regenerative Analog Agroforestry Techniques

The experimental forest could become and important pilot project where regenerative analog agroforestry techniques could be tested by researchers, students and members of the community together. According to Patricia Vaz (2000), Ernst Götsch developed an approach that is able to restore abandoned pastures with degraded soils within five to eight years, making use of sustainable principles. Indeed, Götsch has managed to create highly productive and diverse forests without the use of chemical fertilisers, herbicides, pesticides or heavy machinery (Vaz, 2000), but rather by imitating nature. This possibility is crucial not only for reforestation purposes or for the production of new knowledge; its most important contribution is the provision of new skills to small-scale farmers, used to destructive slash and burn agriculture techniques. As mentioned above, anarchic small-scale agriculture and livestock are the largest contributors to the deforestation of the Amazon rainforest (Dourojeanni, 1999; Lozada & Carrero, 2017).

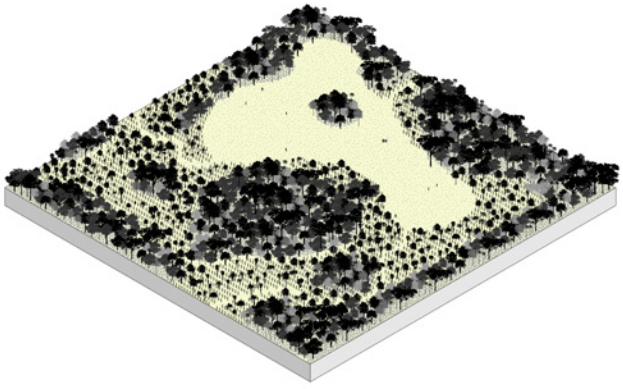
The principles of analog agroforestry must be learned and put in practice. They have to do with the understanding of natural species succession, from short-term crops and pioneers to secondary and ultimately primary forest species over the course of 15 years; the substitution of some natural species with more beneficial analog ones that grow in similar conditions and succession phases; the awareness of how natural rejuvenation takes place, to manage the different vegetation phases and to allow the succession of one phase to another; but also with selective weeding and pruning, soil regeneration and the management of a permanent soil cover (Goetsch, 1992; Vaz, 2000). Once these principles have been learned, the preparation, establishment and management of highly productive reforestation projects could take place.



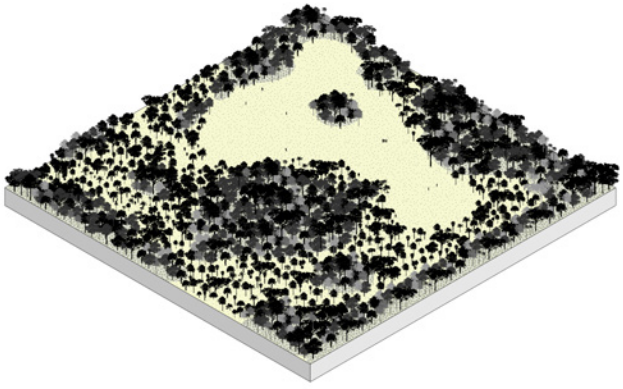
Existing Situation
Degraded land and fragmented patches of forest around the campus



Phase I / II
Short-term crops and pioneer fruit species are grown for local consumption



Phase III
Medium and long cycle species of secondary forest begin to grow



Phase IV
Some species are gradually replaced by primary forest species

FIG. 8.50 Small-scale agriculture in the Amazon makes use of destructive slash and burn techniques. Farmers take advantage of these low-nutrient soils while they can. But as soon as the nutrients are depleted, they move and start over the same process somewhere else. Inside the Frontier Campus, patches of fragmenet forests that resulted from this process can be found today.

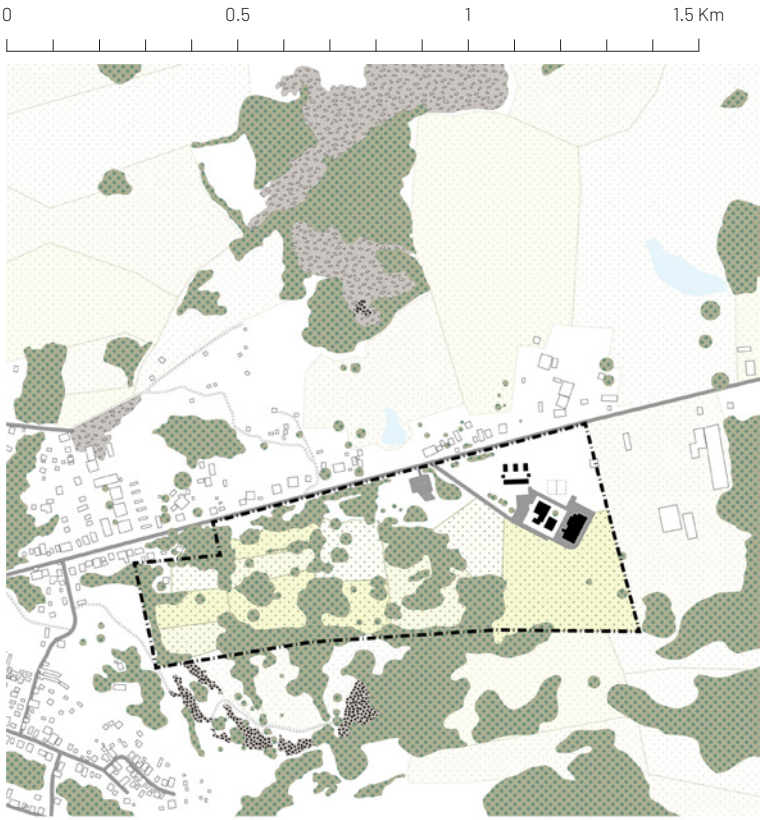
FIG. 8.51 In the first two years, short-term crops for local consumption should be planted to initiate the process of ecological succession. But the pioneer fruit species that will have a more important role in the second phase of the process also need to be planted in this stage (Vivan, 1998). The location of those crops should be designed to recconect the fragmented patches of forest.

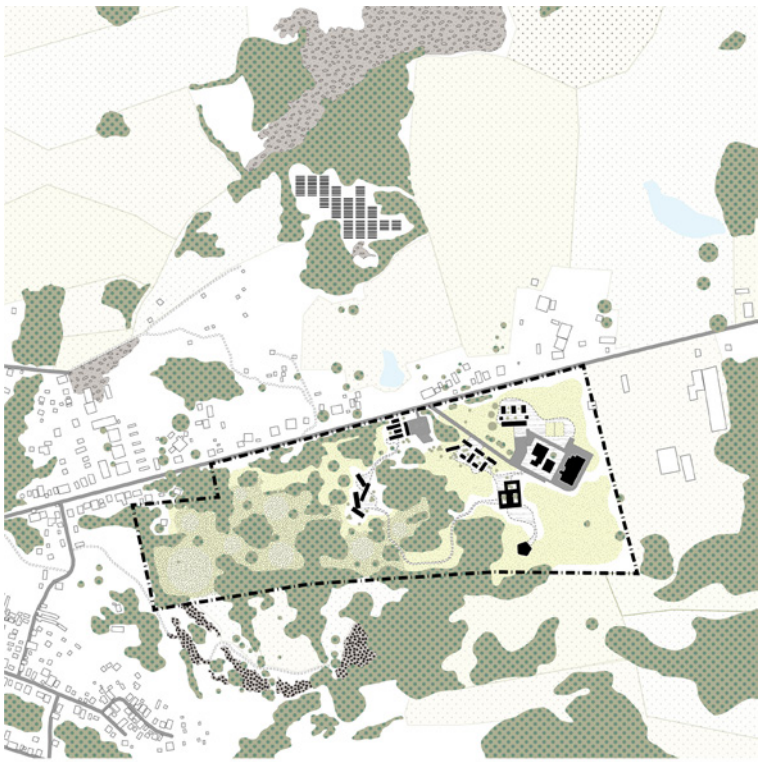
FIG. 8.52 The ecological succession process that was initiated in the first phase of the strategy is becoming more defined by this point, after five years. Indeed, the commercial production of perennial species from the secondary forest (medium and long cycles), has already begun. Some of these species are Cacao, Citrus, Avocado, Chayote and Amazon Grape, among others (Vivam 1998).

FIG. 8.53 After 10 years, some of the species of the secondary forest that occupy the upper strata begin to decline, and they are gradually replaced by species of the primary forest (Vivan, 1998). The promotion of restoration by use transformed a former savanna in a productive and biodiverse forest, producing new knowledge and creating new skills among local communities.

FIG. 8.54 Current situation of the IUTEMAR Frontier Campus of Tumeremo, in between farmlands and a vulnerable tropical forest just outside the perimeter of the Imataca Forest Reserve. Fragmented patches of forest lie inside the site, large tracts of deforested areas can be found to the north, and polluted extractive wastelands can be seen south of the campus. Source: all maps made by the author.

FIG. 8.55 In a phirst phase of the strategy, a number of new buildings will be built around the existing infrastructure of the campus. The expansion of the cluster will depend on how much space is needed by the academic institutions and the research centers that will be attracted; but also on the spatial requirements of the programs that will emerge. Some of these new uses might be nurseries, greenhouses and seedbeds, but also information centres, multipurpose rooms, auditoriums, and a range of dining and service facilities to support students, staff and researchers. A terminus for the common transport system should be located close to the campus to provide access from all towns.To provide the energy that will be demanded, a solar farm can be promoted on deforested areas.





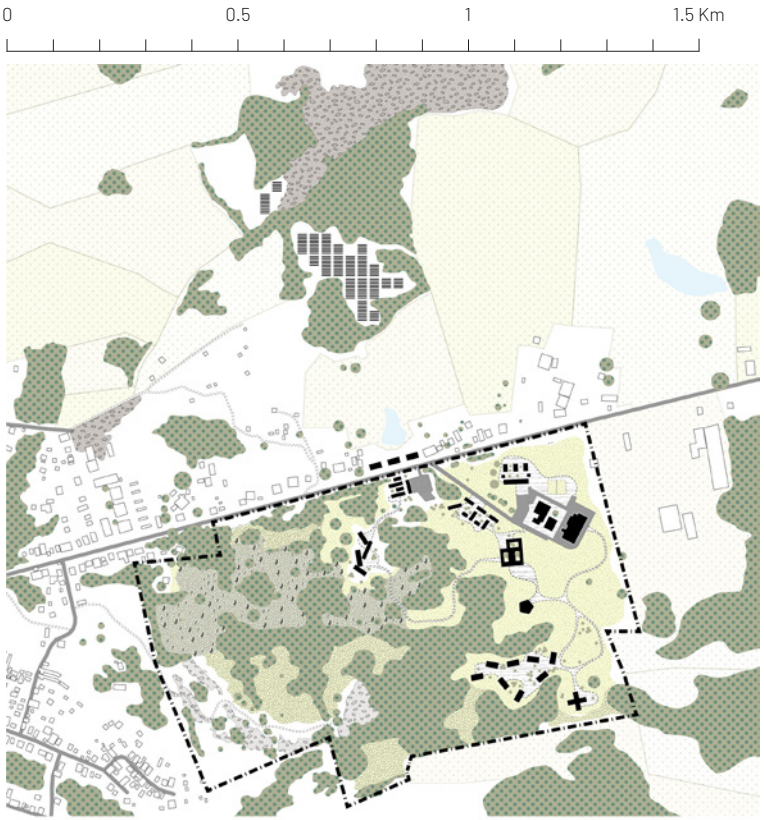


FIG. 8.57 In the next phase of the strategy, and only if necessary, new buildings could be built to support the growing demands of the cluster. Some of these new programs might be residences for students and staff, and spaces for recreation and leisure. If energy demand increases, then the solar farm on top of deforested areas also needs to be expanded. The experimental forest inside the campus could grow, so as to restore the polluted axtractive wastelands south of the campus.

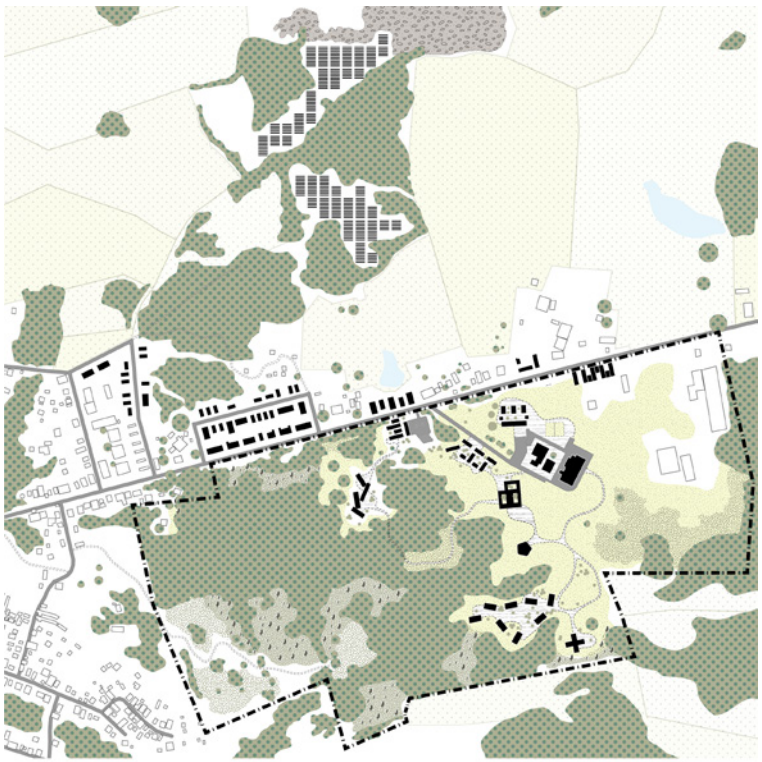


FIG. 8.56 In the consolidation phase of the strategy, special attention needs to be given to the spatial and environmental qualities of the town beyond the limits of the R&D campus. If the cluster becomes a pole of attraction, and with the increased accessibility brough by the intertown transport system, the land along the road that stretches from the trunk road to the campus will become attractive for urban growth. This needs to be taken into consideration, so as to provide a good living environemnt and prevent further environemntal degradation. No more forests should be lost, and priority for urban development should therefore be given to open land, deforested areas.

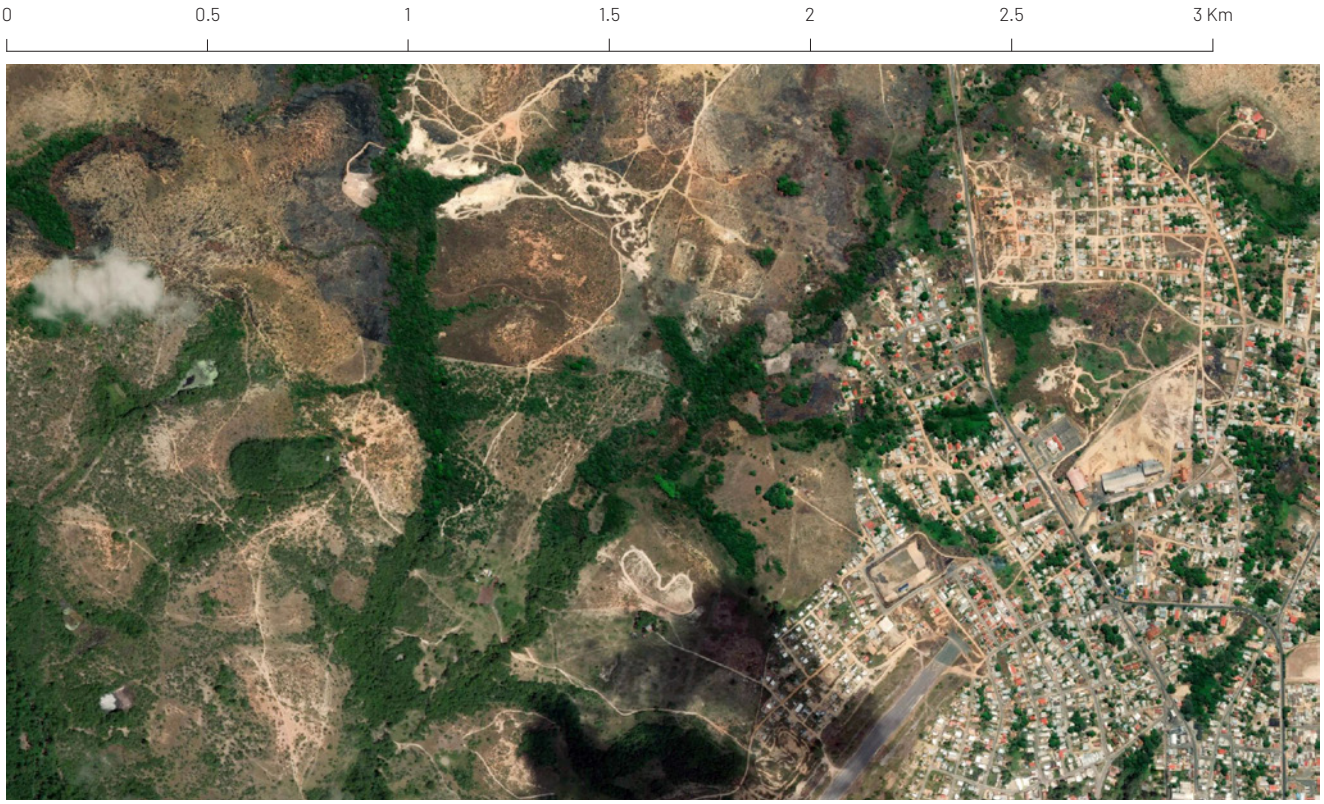


FIG. 8.58 Satellite view of the north of Guasipati, where the production cluster is being proposed. Source: Google Satellite (QGIS).

FIG. 8.59 Location of the production cluster in Guasipati, on land currently used for industrial extraction. Source: made by the author.

8.2.4 – **Promotion of Specialized Clusters**

By exploring the potential of the forest to generate new economic activities, the R&D cluster of Tumeremo will open new windows of opportunities for the creation of added value with the processing of NTFP. By combining the scientific knowledge that will be created with the natural resources and the human capacities available in the region, an entrepreneurial discovery process will lead to the development of unexpected activities (OECD, 2013). The new conditions will facilitate the emergence of micro businesses and SMEs in the PUR, seeking to manufacture semi-finished and finished goods with the NTFP that have been harvested in the forest reserve.

The strategy promotes the creation of a productive cluster in Guasipati to generate the spatial conditions that are necessary to benefit from the advantages of agglomeration. As mentioned above, Guasipati is the most attractive location within the PUR for the creation of such a cluster for a number of reasons. But the identification of a suitable location in the town is just as important. The analysis of the existing conditions revealed that a large industrial extraction site next to the main passenger terminal of Guasipati could be an ideal location for this cluster. The plot is large enough to host an important number of enterprises, close to the airport and along the regional trunk road; it is in a segregated area with very low densities, and therefore its location will not disturb consolidated residential areas; it is on the outskirts of the town, so there is enough room for expansion in the future; and finally, the existing bus station provides very good accessibility to the population of all three towns so as to benefit from the new employment opportunities that will be offered in this part of the PUR.

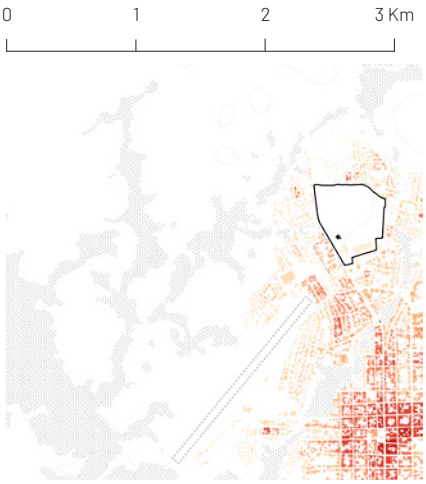


FIG. 8.60 The site is close to the airport, in an unconsolidated residenial area with very low densities. Source: made by the author.

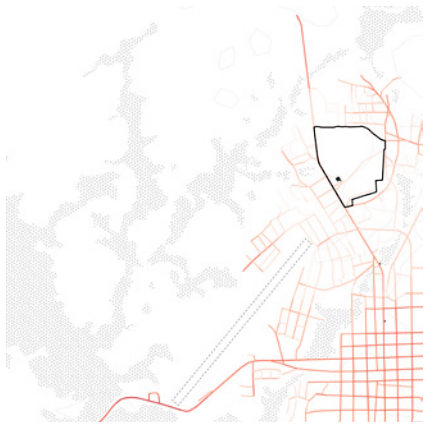


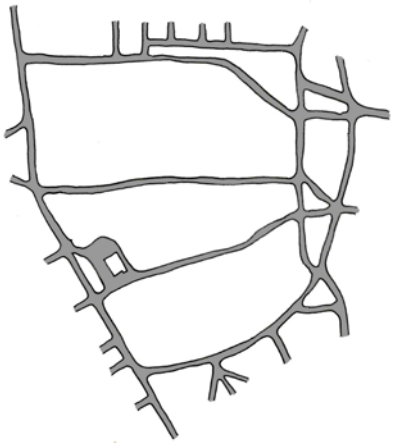
FIG. 8.61 The site is located on the outskirts of Guasipati, in a segregated area with por levels of integration with the rest of the town. Still, the main passenger terminal is inside the area. Source: made by the author.

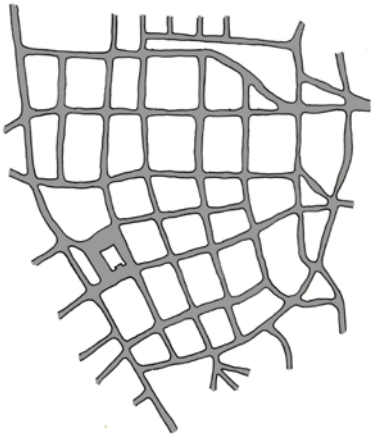
The production cluster should be developed with a smart specialization approach (OECD, 2013). Activities, rather than sectors, must therefore be promoted within the PUR to achieve a certain degree of specialization, since activities can easily be tied to specific technologies, capabilities and natural assets that are available in the region. To further facilitate the growth of local enterprises, the development of an ICT Center inside the cluster needs to be considered. This project will provide technical support to the emerging enterprises and increase the competitiveness of the region. According to the literature, by stimulating cluster development around key enabling technologies, structural change can be accelerated (OECD, 2013). For this reason, the creation of a mixed-use live/work environment was considered fundamental, so that advanced business services, residences and urban facilities may also be accommodated in the cluster and benefit from each other.

But to facilitate the coexistence of those different uses, a flexible and adaptable spatial framework had to be explored. The exploration of such a framework was crucial for other reasons as well. As evidenced above and throughout the report, there are lots of uncertainties around the future in the Venezuelan Guayana, and a rigid design will surely fail due to its inability to cope with the unexpected. Even if the vision that is being promoted is embraced by an important number of stakeholders, it will difficult to know which actors might be involved in the process of transformation and what spatial conditions they will required. For all these reasons, a flexible an open-ended design needs to be made, avoiding blueprints at all cost. It is important to mention that even though the production cluster of Guasipati was chosen as an example in this research, with the purpose of showing how design should be engaged at the small-scale in these contexts of high uncertainty, the same logic needs to be applied anywhere in the region.

The Search for an Adaptive Spatial Framework

When designing the spatial framework of the production cluster, it was important to distinguish between what needed to be strictly fixed and what could be left open to uncertainty. It was important to understand if design could facilitate the application of the strategy over time, regardless of the circumstances and the types of investments that will be made in the future. If the development of the cluster is ultimately led by the private sector, the spatial configuration of the area will probably be very different to the one that would result if local communities had a stronger involvement instead. But if the strategy seeks to create more opportunities for people, then it is important to design a framework than can accommodate all those forms of development, especially because it is difficult to know what will happen in the future. To arrive at a conclusion, the author made use of the method developed by Maxwan Architects and Urbanists for the 'Logica' project in Hoogvliet (Maxwan, 2002). By choosing a few strong characteristics and by combining them in a systematic way, an arrangement of alternative designs will result from this process. All of them will be a combination of a series of strict guidelines that still allow a high degree of freedom. As stated in the Logica document, it is a matter of doing a few things well rather than designing all in a poorly fashion (Maxwan, 2002). In this case, the characteristics chosen for the design of the production cluster are related to the structure of the new road network, to new urban green spaces, and to the type of mixture that may be promoted to guarantee a live/work environment.





1. ***Road Network***

R0 Large Blocks

R1 Small Grid

2. ***Urban Green Spaces***

G0 One Green Corridor

G1 Green Network

3. ***Type of Mixture***

F0 Mixed Use Buffer/ Productive Core

F1 Small-Scale Live/Work Environment

A new road network needs to be built, since the existing block is extremely large and may lead to an inefficient use of the land. If micro business incentives are given to local communities and the existing road structure remains untouched, the density of the cluster could remain very low and the benefits of agglomeration will not be enjoyed. In addition, good accessibility needs to be guaranteed to the businesses that will be accommodated and to the people that live in the surroundings. Two different alternatives have been explored: one with two main roads that cross the area from east to west, dividing the large block into three units [R0]; and another one which proposes a grid structure made of smaller blocks with an average size that is similar to the one of the surrounding areas and the historic center [R1]. It could be argued that the first option is more suitable for the development of a traditional SME cluster, and that the small blocks facilitate the accommodation of a dense micro business cluster led by local communities instead. But this is not entirely true, since both types of development can also be promoted the other way around with different spatial results. But this will be illustrated later in this report. Regarding accessibility, the large blocks [R0] create better conditions for businesses, while the small grid [R1] greatly improves the integration of the surrounding areas to and from the main passenger terminal as well.

The cluster is located between two ecological corridors that stretch along minor tributaries of the Yuruarí River. The expansion of Guasipati to the north led to the occupation of formerly open savannas and to the fragmentation of those corridors over time. For this reason, the creation of new urban green spaces should be promoted in the cluster, aimed to restore the continuity of the ecological corridors and to ensure the spatial quality of the development in the long-term. This could be done by designing processes of ecological succession, in close cooperation with the research and knowledge institutions based in Tumeremo. The new urban green spaces will also play an important role in the mitigation of the noises made by the manufacturing enterprises, allowing the coexistence of different uses. Two alternatives were considered for these green spaces: one with a single but generous linear park that stretches from east two west and reconnects the fragmented corridors [G0]; and another one that promotes the creation of a green network, which divides the area into smaller units and guarantees the existence of alternative spaces for pedestrian mobility separated from the traffic system [G1].

FIG. 8.62 To test different possibilities for a flexible spatial framework, a few strong characteristics were chosen. Those characteristics deal with the road network, with new urban green spaces, and with the type of mixtures that will guarantee the desired work/living environment of the cluster. For each characteristic, two options were proposed. Source: drawn by the author.

To guarantee the existence of a live/work environment in the future, two different alternatives were also explored. The first one considers a buffer area of 50 meters along the perimeter of the existing block, so as to create space for mixed-use developments next to the trunk road and close to the residential surroundings [F0]. In this alternative, the core of the block would have a more productive function, regardless of the type of investment. This mixed-use buffer may also be seen as a strategy to create a transition area from the residential neighborhoods around the block and the productive core. Not only because it separates uses and prevent conflicts between industrial and residential areas, but because it will accommodate programs, functions and services that cater to businesses and neighborhoods at the same time. The other alternative is a more homogenous one, since it stimulates the construction of hybrid building typologies where residential units and productive spaces can coexist [F1]. What really matters in this alternative is the parcellation structure and the size of the plot, since the goal is to facilitate the development of the cluster from the bottom-up in a community-led scenario.

ROGOF0 Productive Superblocks

ROGOF1 Introvert Blank Canvas

ROG1F0 Forested Backyards

ROG1F1 Structuring Footpaths

FIG. 8.63 Combination ROGOF0, called 'Productive Superblocks'. Two roads cut across the large block and a linear park creates a generous urban green space in the middle. The mixed-use buffer around the perimeter becomes a transition zone between the surrounding areas and the productive core of the superblocks. Source: made by the author.

FIG. 8.64 Combination ROG1F0, called 'Forested Backyards'. Two roads cut across the cluster and a green network divides the large blocks into smaller units, creating a transition between the productive areas and the rest of the cluster. All the plots are connected through the backyard to the green network, which is an alternative for pedestrian mobility. Source: made by the author.

FIG. 8.65 Combination ROGOF1, called 'Introvert Blank Canvas'. Two roads cut across the large block and a linear park creates a generous public space in the middle. Micro businesses integrated to single family residences define the edge of the roads, creating an inner courtyard within the superblocks that can be freely adapted to the needs of the new enterprises. Source: made by the author.

FIG. 8.66 Combination ROG1F1, called 'Structuring Footpaths'. Two roads cut across the cluster and a green network structures the large blocks by dividing them into smaller pockets. Micro businesses integrated to single family houses fill the pockets and define the profile of the roads. The backyards can be used as an additional space for manufacturing. Source: made by the author.

R1G0F0 *Productive Islands*

R1G0F1 *Common Courtyards*

R1G1F0 *Green Noise Buffers*

R1G1F1 *Dense Micro Business Cluster*

FIG. 8.67 Combination R1G0F0, called 'Productive Islands'. A grid divides the large block into smaller units and a linear park creates a generous public space in the middle. The mixed-use buffer fills the blocks around the perimeter and become a transition zone between the surrounding areas and the productive islands in the core of the cluster. Source: made by the author.

FIG. 8.68 Combination R1G1F0, called 'Green Noise Buffers'. A grid divides the large block into smaller units and a green network creaes a noise buffer between the productive areas and the rest of the cluster. Mixed-use developments fill the blocks around the perimeter while the manufacturing enterprises are accomodated in the core of the cluster. Source: made by the author.

FIG. 8.69 Combination R1G0F1, called 'Common Courtyards'. A grid divides the large block into smaller units and a linear park creates a generous public space in the middle. Micro businesses integrated to single family residences define the edge of the roads, creating a system of small inner courtyards that is common to all the businesses that share the block. Source: made by the author.

FIG. 8.70 Combination R1G1F1, called 'Dense Micro Business Cluster'. A grid divides the large block into smaller units and a green network creates an overlapping network for pedestrian mobility in the cluster. Micro businesses integrated to single family residences fill the pockets left by the green network, and all the plots have a forested backyard. Source: made by the author.

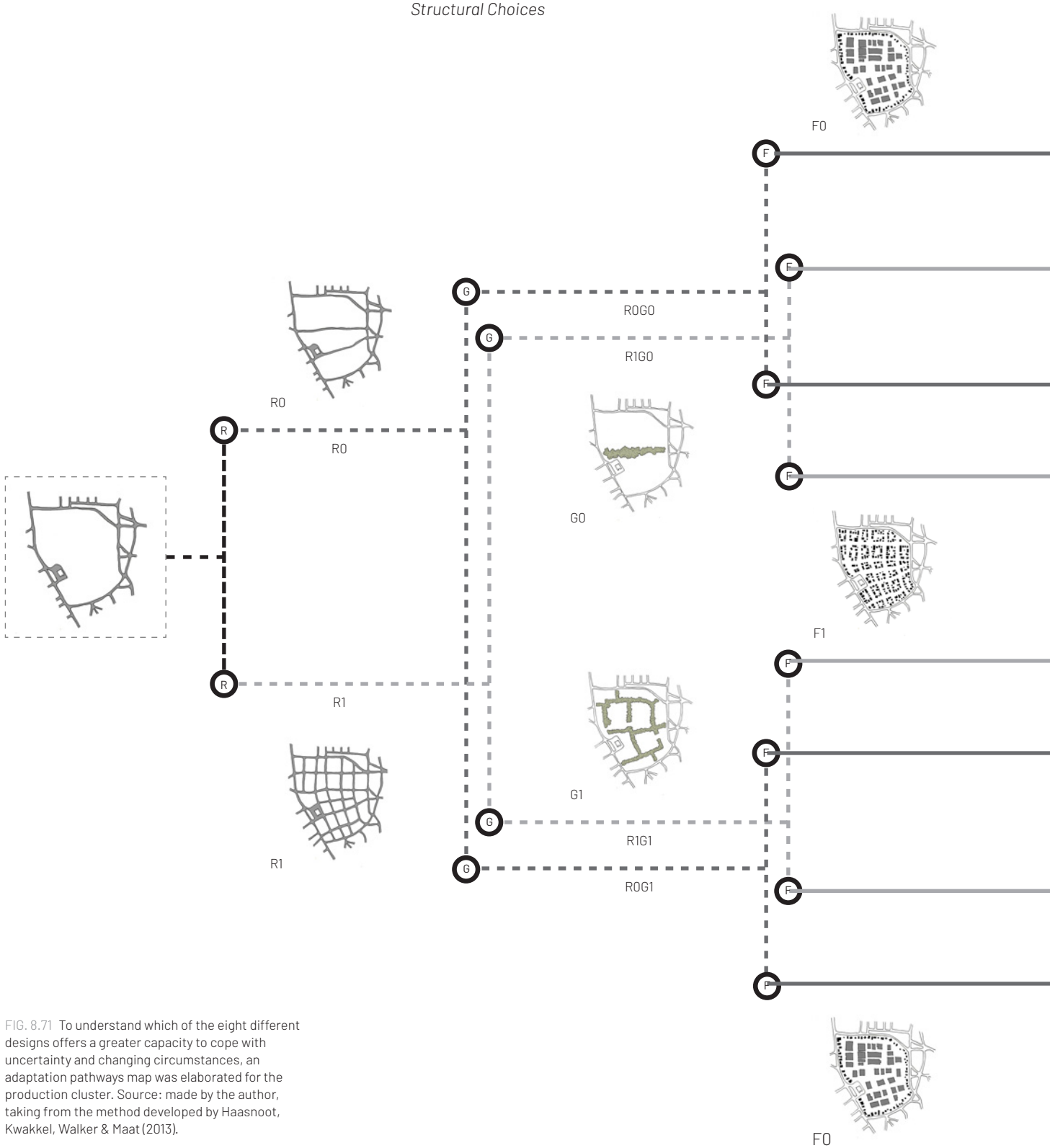
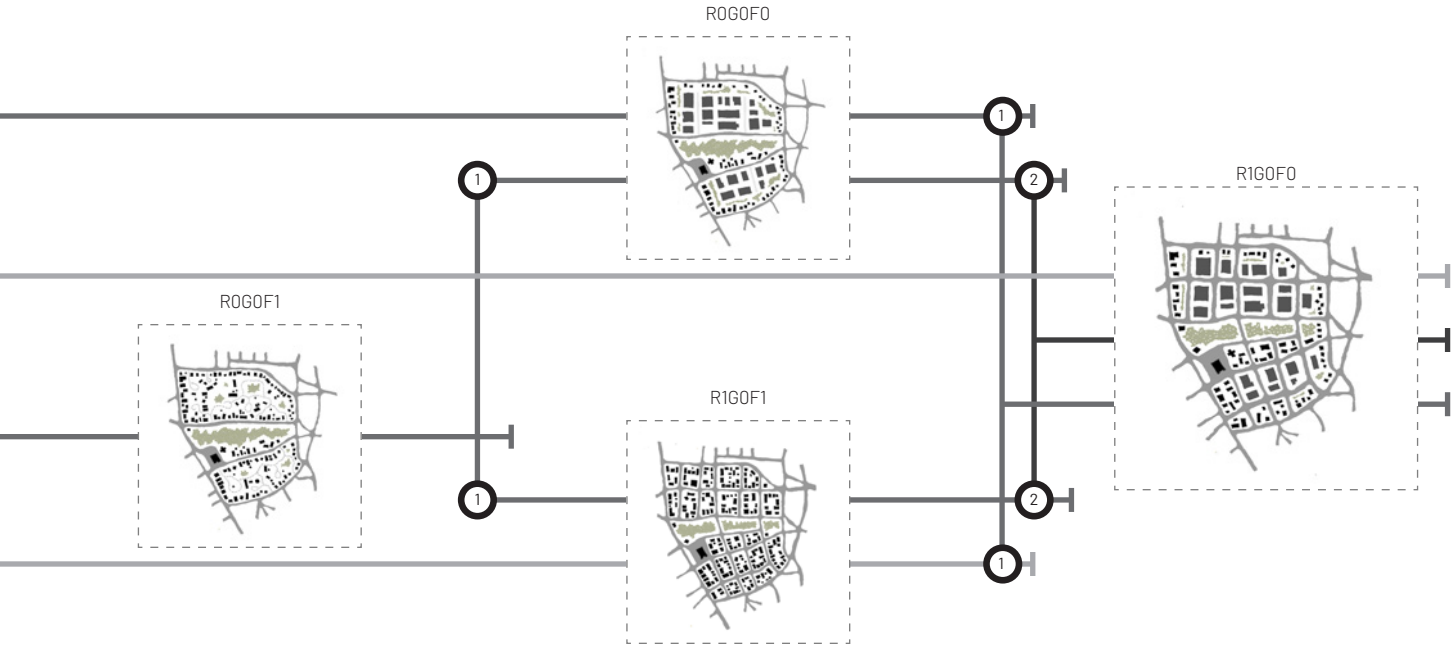
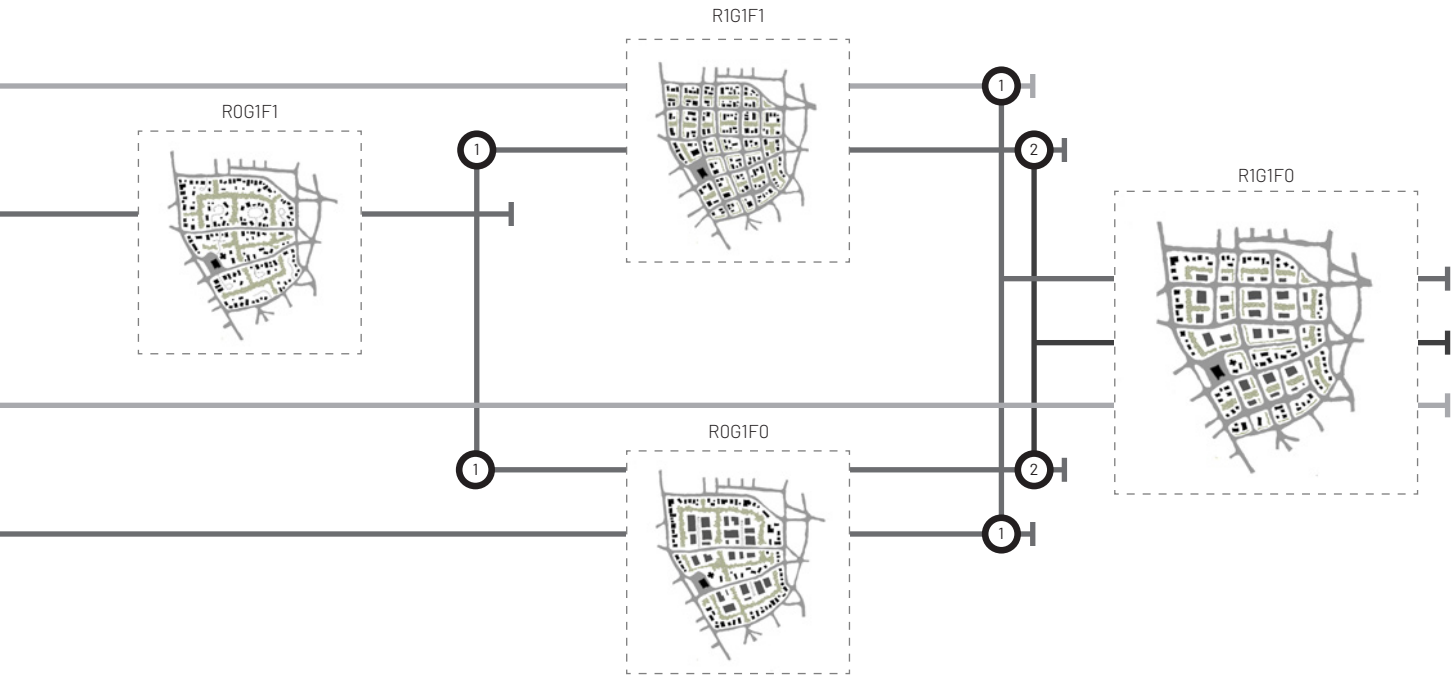


FIG. 8.71 To understand which of the eight different designs offers a greater capacity to cope with uncertainty and changing circumstances, an adaptation pathways map was elaborated for the production cluster. Source: made by the author, taking from the method developed by Haasnoot, Kwakkel, Walker & Maat (2013).


R0G0F0
R0G0F1
R1G0F0
R1G0F1
1
2


R1G1F1
R0G1F1
R1G1F0
R0G1F0
1
2

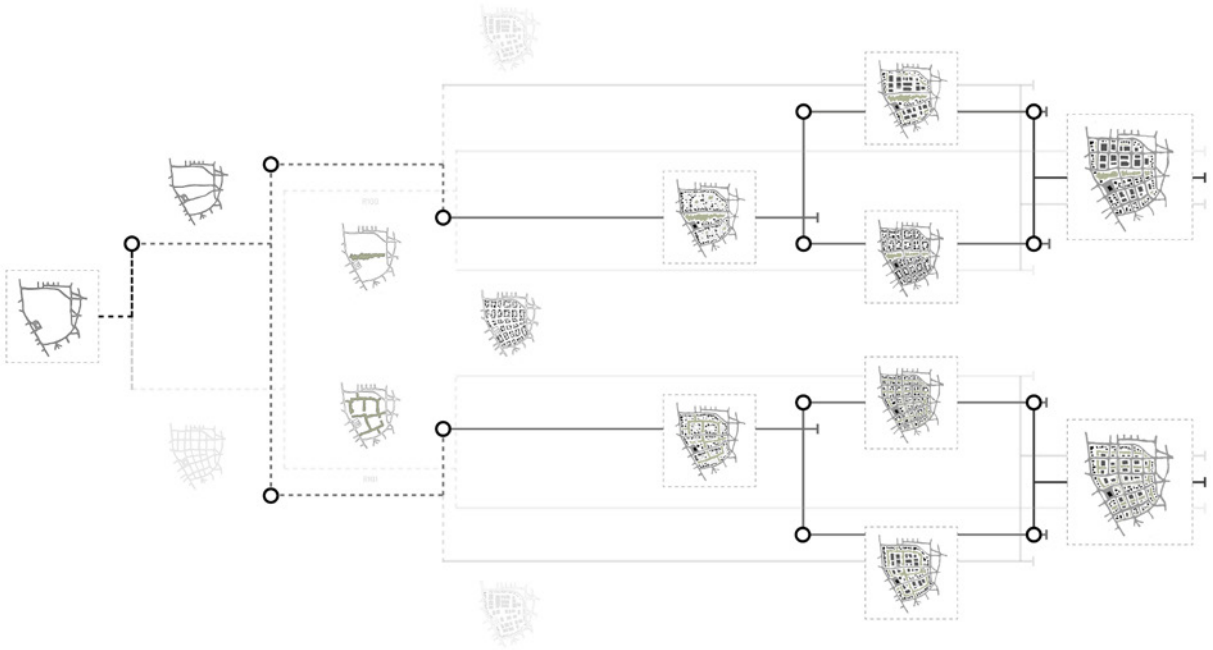


FIG. 8.72 A simplified version of the adaptation pathways map, which highlights the two designs that offer more possibilities to change over time in a progressive manner. Source: made by the author.

The combination of alternatives from the three characteristics resulted in an array of eight different design proposals for the cluster. All of them are attractive and plausible, but they also depend of different arrangements of stakeholders. It could be argued that the visualization of these alternatives is already a good tool to engage with the different stakeholders involved in the development of the cluster, because they can easily see the spatial implications of some structural decisions and what can be gained and lost in each possibility. But for the purpose of this exploration, which seeks to understand the role of design in contexts of great uncertainty, it was more important to grasp which of these alternatives holds a greater adaptive capacity to cope with the future. To do this, an adaptation pathways map was elaborated with the different proposals, taking from the method developed by Haasnoot, Kwakkel, Walker & Maat (2013).

It is clear that different designs derive from a set of structural choices that need to be made in the beginning. But the challenge resides in understanding which of those eight alternatives offers greater flexibility over time, so that stakeholders can change paths and adapt the spatial configuration of the cluster to new needs and circumstances. The criteria used to make this evaluation is a simple one: the most flexible designs are those that allow more changes in a progressive manner. If stakeholders decide to develop a plan that makes use of the small grid [R1] from the early beginning, seeking to facilitate the creation of a dense micro business cluster, they could create a bottleneck for some private investments in need of a larger plot. If larger blocks [R0] were preferred instead, there would be enough space to accommodate any type of development without hindering the grow of the cluster in the long-run. In other words, some designs are more adaptive than other because they allow progressive addition, while others result more rigid because they can only allow change by subtracting built elements.

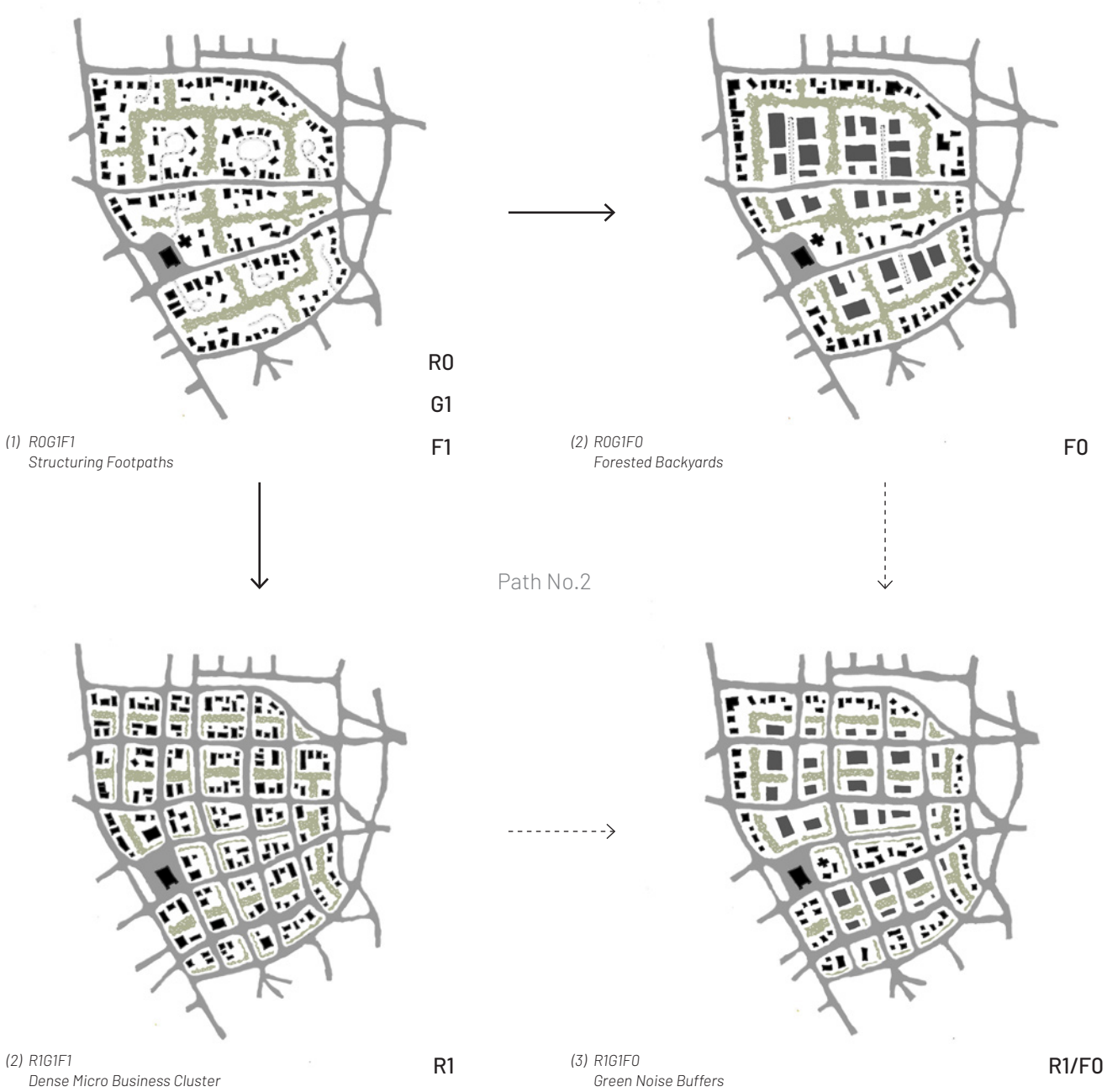
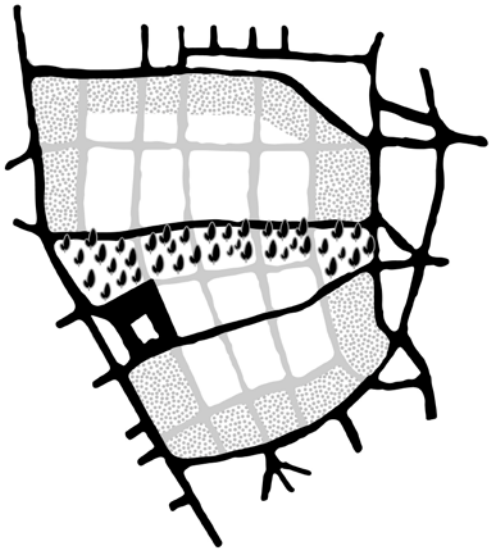


FIG. 8.73 One of the variations that offers a greater adaptive capacity is combination R0G1F1, also referred to as 'Structuring Footpaths'. In the early stages it makes use of the large blocks, the green network, and promotes the development of micro business spaces integrated to small-scale residential units. Over time, and only if the demand for small-scale manufacturing enterprises is high, the cluster could be adapted and allow the introduction of the grid structure. The small blocks will create the conditions for a more efficient use of the land, leading to the consolidation of a dense micro business cluster [R1G1F1].

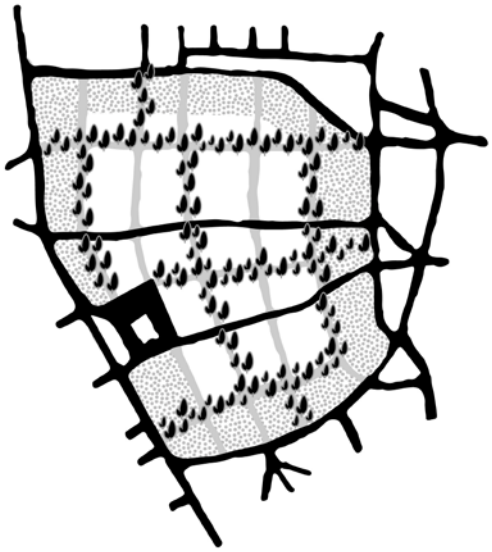
If some of those initiatives grow and a process of mergers and acquisitions starts to take place, small and medium enterprises could develop on the land formerly occupied by many micro businesses. The green network would create a noise buffer between the mixed-use areas around the perimeter and the productive core [R1G1F0], ultimately helping in the coexistence of different uses. But if circumstances were different in the middle stages of the process, and external private investors want to settle their manufacturing industries in the cluster, instead of introducing the grid at this point the type of mixture could be adapted [R0G1F0]. Source: made by the author.

FIG. 8.74 One of the variations that offers a greater adaptive capacity is combination R0G0F1, also referred to as the 'Introvert Blank Canvas'. In the early stages it makes use of the large blocks, the linear park, and promotes the development of micro business spaces integrated to small-scale residences. Over time, and only if the demand for small-scale manufacturing enterprises is high, the cluster could be adapted and allow the introduction of the grid. The small blocks will create the conditions for a more efficient use of the land, leading to the consolidation of a denser cluster structured around a system of small common courtyards [R1G0F1].

If some of those initiatives grow and a process of mergers and acquisitions starts to take place, small and medium enterprises could develop on the land formerly occupied by many micro businesses [R1G0F0]. But if circumstances were different in the middle stages of the process, and external private investors want to settle their manufacturing industries in the cluster, instead of introducing the grid at this point the type of mixture could be adapted [R0G1F0]. Even though that combination could be considered a last stage of a development process, it still has the capacity to introduce the grid in another stage over time [R1G0F0]. Source: made by the author.



Spatial Framework (option 1)



Spatial Framework (option 2)

FIG. 8.75 Schemes of two spatial frameworks that offer a great adaptive capacity for the production cluster. A few strict guidelines structure the area while allowing high degrees of freedom for development. Source: made by the author.

Two of the eight variations showed more adaptive capacity than the others, because they allowed stakeholders to change directions in two different occasions. One of those variations is combination R0G0F1, also referred to as the 'Introvert Blank Canvas'. In the early stages it makes use of the large blocks, the linear park, and promotes the development of micro business spaces integrated to small-scale residences. Over time, and only if the demand for small-scale manufacturing enterprises is high, the cluster could be adapted and allow the introduction of the grid. The small blocks will create the conditions for a more efficient use of the land, leading to the consolidation of a denser cluster structured around small common courtyards [R1G0F1]. And if some of those initiatives grow and a process of mergers and acquisitions starts to take place, small and medium enterprises could develop on the land formerly occupied by many micro businesses [R1G0F0].

An analysis of the most adaptive designs, and an understanding of what needed to be preserved to allow the successive stages of transformation, led to a draft of two different spatial frameworks. The two roads that divide the block into smaller units are fixed on both versions, and so is the preservation of the mixed-used buffer along the perimeter, to ensure that advanced business services to support the manufacturing industries can have a place even if the homogenous live/work environment prevails. The space for the grid needs to be secured as a right-of-way. This decision helps to guarantee access to inner courtyards even if the large blocks are preserved. Regarding urban green spaces, stakeholder can choose from the two available options. But once the decision has been made, it demands cooperation and effort from all to maintain it, since the quality of those green open spaces depends on the success of the ecological succession over time on top of soils with very poor nutrients. All the rest allows a high degree of freedom, and it can be developed with different stakeholder arrangements and adapt to changing circumstances over time.

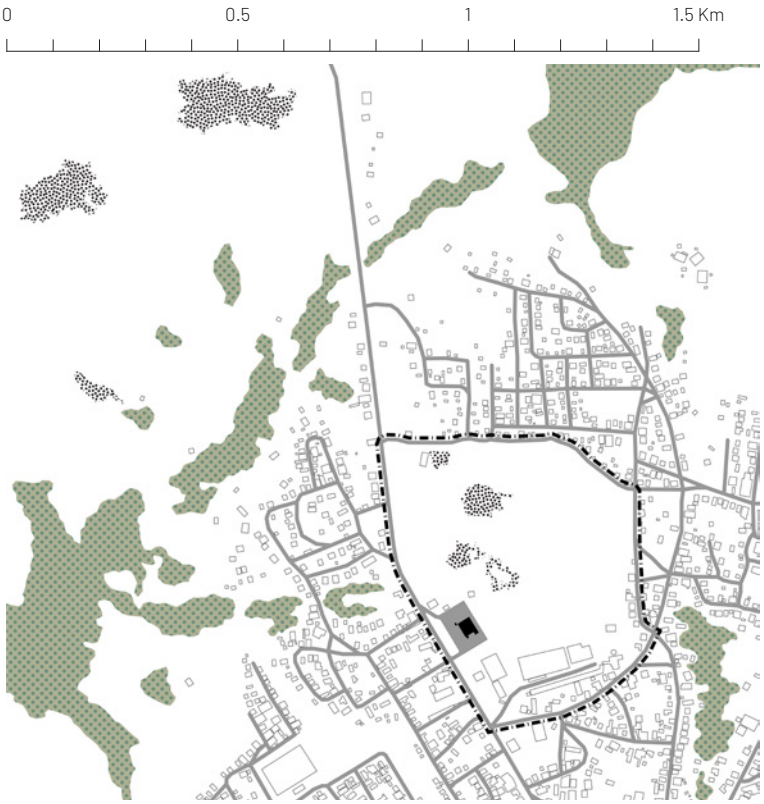


FIG. 8.76 Current situation around an industrial extraction site that is located on the outskirts of the town. Unconsolidated and segregated residential areas can be found around the site, with very low densities and many unpaved roads. The site stands in between two ecological corridors that are under pressure, and which have already been fragmented by urbanization processes. Source: Google Satellite (top), and made by the author (right).

FIG. 8.77 In the early stages of transformation, micro businesses integrated to single family residences define the edge of the roads, while creating a large inner courtyard inside the superblocks [ROGOF1]. These courtyards can be freely adapted to the needs of the new enterprises for logistics and manufacturing, but they could also be used as urban farms. The energy demanded by the local initiatives can be supplied by solar farms on top of the extractive wastelands located close to the north. Source: made by the author.

FIG. 8.79 Over time, and only if the demand for small-scale manufacturing enterprises is high, the cluster could be adapted and the grid may be introduced. Smaller blocks will create the conditions for a more efficient use of the land, leading to the consolidation of a denser cluster structured around a system of small inner courtyards common to all the businesses that share a specific block [R1G0F1]. Source: made by the author.

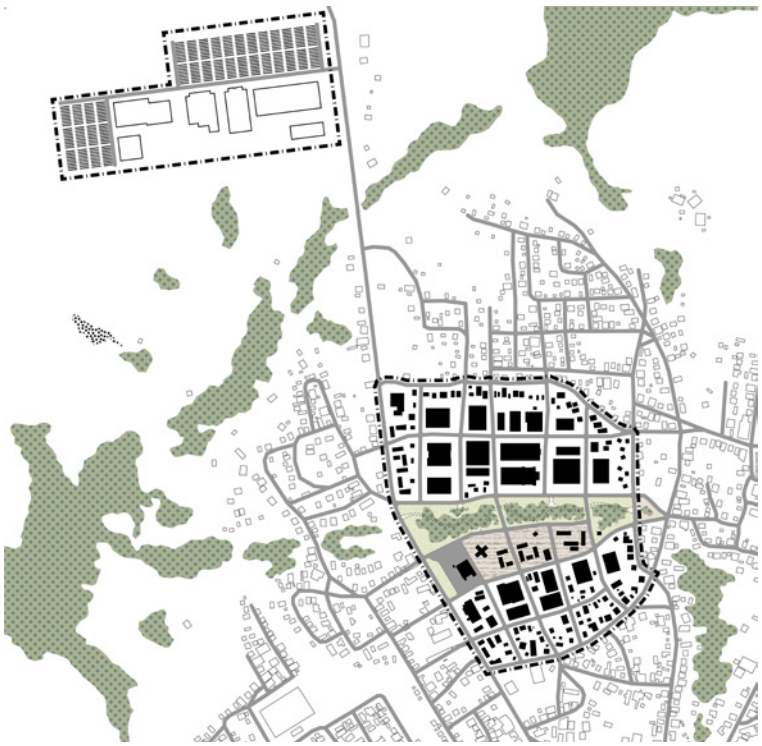


FIG. 8.78 If some of the local initiatives become particularly successful and a process of mergers and acquisitions starts to take place in the cluster, some micro businesses could progressively turn into small or medium enterprises. The mixed-use buffer, understood as a transition area between the surroundings and the productive core, should be guaranteed. In the core of the cluster SMEs could grow on the land formerly occupied by micro businesses [R1G0F0]. Source: made by the author.

1

2

3

FIG. 8.80 Aerial view of Uruyén Camp, in the Gran Sabana sub-region of the Venezuelan Guayana. Low impact architecture facilitate ecotourism and adventure sports in the surroundings. Retrieved from http://campamentouruyen.blogspot.com

FIG. 8.81 Mashpi Lodge, considered by NatGeo as a unique lodge in the world, offers a unique forest experience in the middle of the Mashpi Reserve. Retrieved from https://www.uniqhotels.com

FIG. 8.82 Small-scale bed & breakfasts can also be stimulated within the urban centres of the PUR. Renovated residences, such as Hotel Casa Grande in the city of Ciudad Bolívar, can provide lodging in well-served an accessible areas. Retrieved from https://hotel-casagrande-ciudadbolivar.com.ve

8.2.5 – **Punctual Interventions**

The strategy needs to be accompanied by a series of punctual interventions aimed at improving the spatial and environmental qualities of the region. Besides the linear park that has been described above, a River Park is also being proposed in El Callao, in between the two bridges and along the waterway. Today, illegal small-scale miners are extracting the gold that lies in the alluvial placers of the Yuruarí River, especially around the the Nacupay sector of El Callao. Therefore, the creation of the River Park must be linked to decontamination and restoration projects that could be carried out in close collaboration with the R&D center of Tumeremo. These types of projects are not fundamental for the transformation of the productive system. Public spaces, parks, constructed wetlands, and soil remediation projects do not generate new employment opportunities and are unable to reduce the current dependence on resource extraction. But this argument should be reversed, because the creation of new economies demands the improvement of living conditions. Otherwise, local communities will not have an incentive to stay in the PUR once they have acquired new skills and capabilities; and professionals from other parts of the region, attracted by the new developments, will be discouraged to remain and live in the towns. In addition, the development of certain projects will have an impact on the existing fabric. Some areas will become more accessible, and the value of the land will increase in certain places. All these factors need to be taken into consideration to guarantee the spatial quality of the PUR in the future. For example, the motivation to propose a park along the Yuruarí River in El Callao responds not only to the desire of enhancing the quality of life of local communities, it is also a way of preventing the informal development of a natural area that will become highly accessible with the construction of the new bridge and the consolidation of the high street.

These punctual interventions will also improve the conditions for the development of a strong ecotourism sector within the PUR. These are also punctual interventions that depend on private investment, and which can be promoted with policies and incentives. To accommodate tourists, a system of lodging facilities needs to be put in place. Of course, this depends greatly on the type of lodging and to the public it caters, but it is possible to speculate with two types of systems throughout the territory. One fosters the development of small-scale ecolodges outside the urban centers and in close proximity to the geographical features that are present in the territory. It is a disperse strategy of punctual interventions, which should be eco-friendly and self-sufficient in multiple ways. The other promotes the renovation of existing buildings in the three urban centers, so that a system of small-scale lodging facilities could be developed in accessible and well-served areas. This strategy promotes clusters of punctual interventions, which depend greatly on local investment and entrepreneurship.

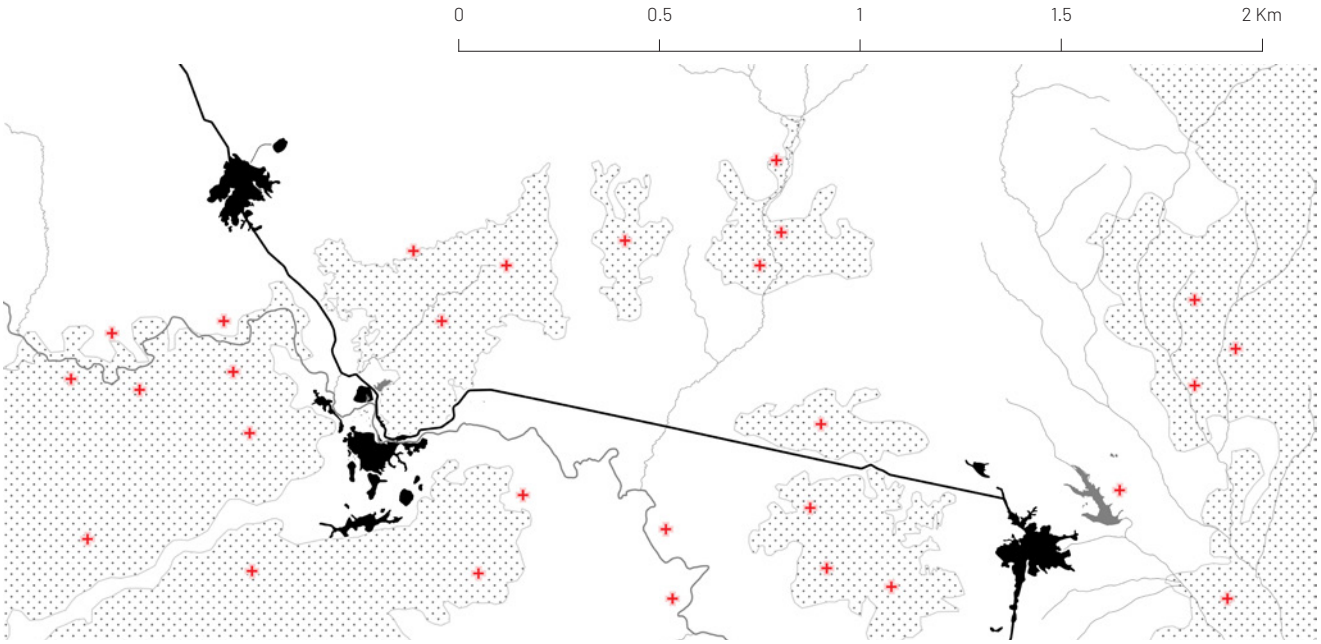


FIG. 8.83 A system of small-scale ecolodges could be stimulated outside the urban centers and in relation to the surrounding natural assets of the territory. Policies and incentives could be created for the development of this type of punctual interventions inside the forest reserve, along waterways, in the existing savannas and on the hills surrounding El Callao. Source: made by the author.

FIG. 8.84 The renovation of existing buildings in the urban centers could also be promoted, so that a system of small-scale facilities can develop in accessible and well-served areas. This alternative depends on local entrepeneurship. Policies and incentives could be created to encourage families to transform their homes and engage with this form of economy. Source: made by the author.

FIG. 8.85 Current situation in El Callao. There is only one bridge over the Yuruarí River to enter the town. The historic center, which is also the densest part of the town, is located just across the bridge and at the foot of the hills. To the east, a small and informal settlement has grown near the river, since it depends on surface gold extraction from the riverbed. Source: all maps made by the author.

FIG. 8.86 In the early stages, the first intervention that needs to be stimulated is the community hub, to build capacities and capabilities among the local population. The promotion of a Cultural Center is also crucial, since it will play an important role in the diffusion of local values, traditions and knowledge within the PUR.

To guarantee access from all the other towns to the opportunities that will arise in El Callao, the intertown transport system must be functioning. Even if the second bridge over the Yuruarí River has not been built yet. The degraded and polluted land along the river to the east, around the mining sector of Nacupay, should be restored in close collaboration with the R&D cluster of Tumeremo. Source: made by the author.

Existing Situation

1 Regional trunk road
2 Existing bridge over Yuruarí River
3 Main passenger terminal of El Callao
4 Nacupay mining sector
5 Alluvial gold mining site

First Phase

1 Cultural center
2 Community hub
3 River park - first phase

FIG. 8.87 In the second phase, the new bridge over the Yuruarí River becomes more important. Its construction will create the possibility of bypassing the trunk road and crossing El Callao with the intertown transport system. Buses will enter the town from one bridge and exit through the other, stimulating the creation of a high street that will be highly accessible to all the towns of the PUR.

This high street could be densified in blocks where densities are low, and diversified where residential uses alone are prevailing. To anticipate the possibility of informal urbanization along the banks of the river, because of its proximity to the high street, a River Park with equipped with public facilities needs to be promoted.

FIG. 8.88 Open land across the Yuruarí River, along the trunk road and around the other end of the new bridge, will also become more accessible. If there is pressure for urban growth, this could be an attractive location for mixed-use and inclusive new developments.

In this phase, and only if considered necessary, a third bridge could be built over the river to consolidate the mining village of Nacupay to the east, further facilitating the integration of this community to other forms of economy. By this point, the polluted land in the surroundings of this village should have been restored. Source: made by the author.

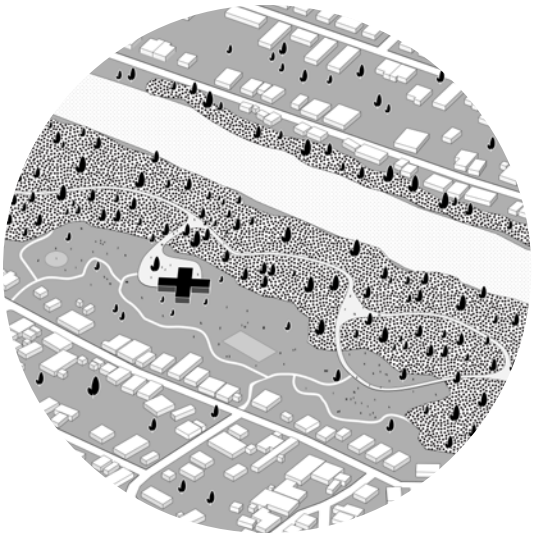


FIG. 8.89 An axonometric view that shows how the River Park along the Yuruarí River could be, integrated to the surounding fabric and equipped with public facilities. Source: made by the author.

Subsequent Phases

1 New bridge
2 River park - second phase
3 High street
4 Public programs

5 Space for urban growth
6 River park - third phase
7 River restoration project
8 New bridge
9 Public programs

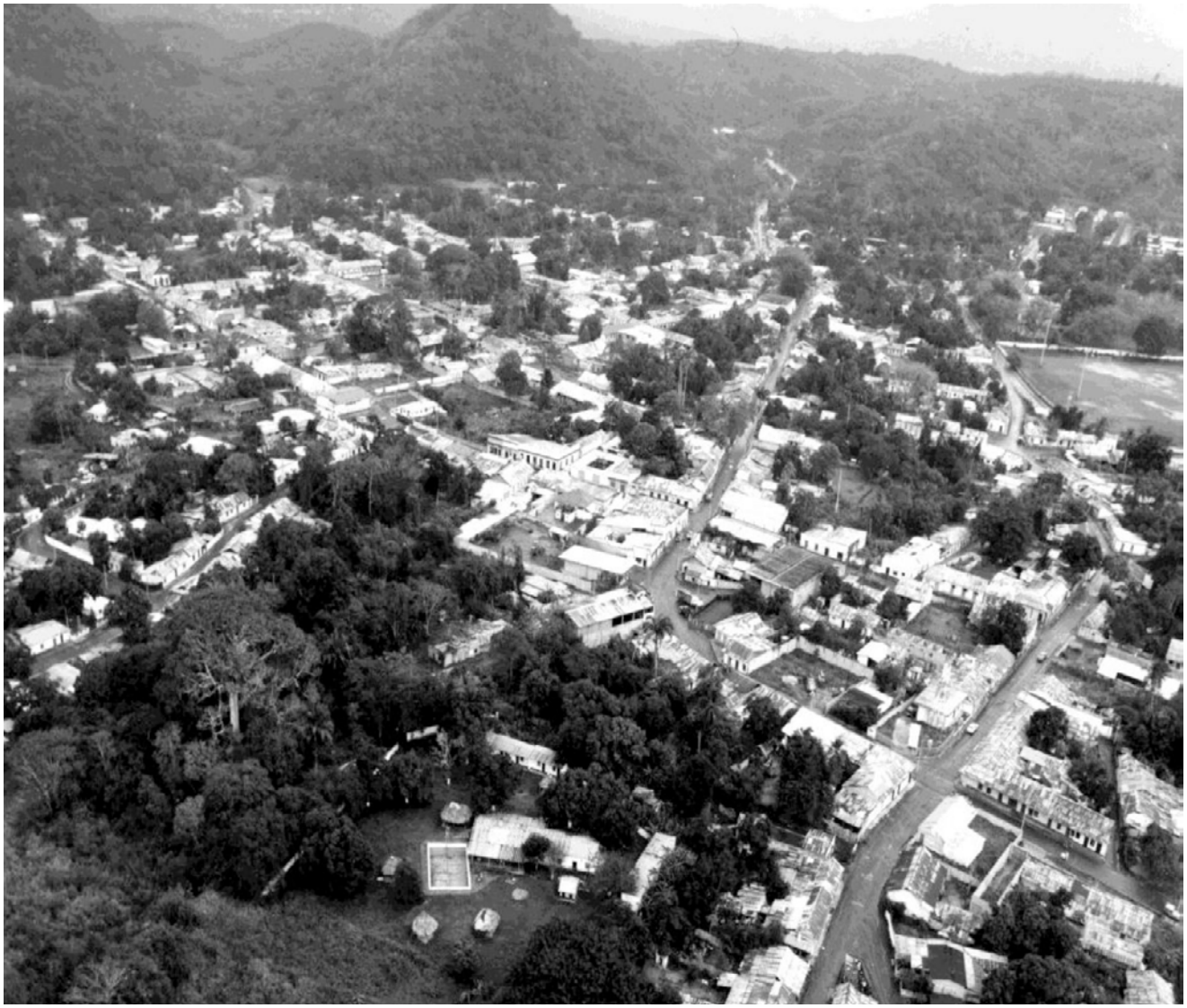


FIG. 8.90 Aerial view of the mining town of El Callao, with the hill range in the background (Sarti, 2012). Retrieved from Retrieved from https://issuu.com

To conclude, it is important to outline that in one way or another all the projects are interlinked. Even though some are more related to the diffusion of innovation and knowledge throughout the region, they depend on the building of local capabilities or with improvements on accessibility. Other projects are aimed to support the development of new industrial spaces, but they are also facilitating the diffusion of technology and enabling locals to connect to the global market. And as it has been stated, the improvement of living conditions creates an attractive environment that encourages locals to remain in their hometowns, even if they have been capacitated with new sets of skills that may be required in other parts of the country. But the success of this strategy depends on the capacity of a wide range of stakeholders to manage change in a peripheral part of a peripheral region. As James Corner has stated in The Agency of Mapping, 'the difficulty today is less a crisis of what to do than of how to do anything at all' (Corner, 1999, p. 251).

FIG. 8.91 The entrance of an industrial gold mine run by state-owned company Minerven. The billboard welcomes visitors, and says: 'Proud to be miners!'. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org/

9 – Application of a Regional Strategy

Managing change in a difficult region

FIG. 9.1 Minerven, a state-owned mining company that has been destroyed in practical terms; and Planta Perú, one of its dismantled industrial plants. To the rest of the world, Minerven still exists, but the company is known to be buying gold directly from criminal organizations that control small-scale mining operations to launder its illegal origins. Photograph taken by Clavel A. Rangel. Retrieved from https://www.flickr.com/

This chapter deals with the application of a strategy in a very particular and complex place. Both endogenous growth theory and the literature on polycentricity stress the importance of working in networks and the promotion of collaboration among stakeholders, at all levels and from all sectors. In that sense, the activation of a PUR in this part of the region brings new challenges that need to be addressed, such as the adaptation and flexibilization of the existing government structure. With the support of the state as a facilitator, but also with the engagement of civil society organizations, private companies and NGOs, external funding can be found for the development of key projects that will stimulate the growth of local initiatives and alternative economies. To understand how the path of this region can be changed, a range of constraints and difficulties that create an unhealthy implementation environment will be outlined at first. Then, some comments will be made regarding the role of the state in the transformation process. Next, the different projects that constitute the strategy will be evaluated against the theoretical framework, to understand which are the most relevant to trigger the process of transformation. One of those projects will be used as an example to illustrate how change can be managed by working in networks and promoting collaboration. And finally, an assessment of the strategy will be made to understand if it manages to successfully answer the research question that was set at the beginning of this work.

‘We are authorized to buy from 17 or 18 associations of artisanal gold producers, but we know they buy from illegal miners. That’s how it works now. People are looking to conduct business with us to become legal’

[Minerven employee • El Callao, Bolívar]

Stories of Illegality

‘Local miners tell that working for Minerven used to mean status, and that employees would wear company shirts with honour, but things have changed in recent years. Minerven has fallen into decay. Production plants have been dismantled and the yearly production targets are not met, by far’ (Ebus, 2018). In parallel, illegal small-scale miners have taken control of the underground galleries and the alluvial gold placers of the region; and Minerven is buying gold directly from them, laundering its illegal origin in alliance with organized criminal groups. Only a small part of that gold ends up in the vaults of the Central Bank of Venezuela, since 80% of the what is extracted in the Venezuelan Guayana is being smuggled abroad (Ebus, 2018).

The microstories presented in this report are fictional constructions made by the author, who relied on newspaper accounts, reports, and photographic material on the region that can be found online. All of them are based on true stories, and an effort has been made to preserve their authenticity. Still, the narrative exercise had to be done to give some passive descriptions a voice in the first person, or to build a written and visual context around certain quotes. Some of the photographs that accompany the microstories come from the same source, but this was not possible in all cases. The idea is to give a picture of how people live in peripheral and remote areas of the Venezuelan Guayana.

Ebus, B. (2018, January 15). *Digging into the Mining Arc. The destruction of 110 thousand square kilometres of forests in the largest mining project in Venezuela.* Retrieved from https://arcominero.infoamazonia.org/

FIG. 9.2 Small-scale gold miners in Planta Perú, formerly managed by Minerven. Photograph taken by Clavel A. Rangel. Retrieved from https://www.flickr.com

FIG. 9.3 As long as gold prices are high, it will be difficult to outweigh the profitability of its extraction with sustainable forms of employment. But capacity building and the design of a transtition towards another economy is still necessary. Photograph taken by Bram Ebus. Retrieved from https://arcominero.infoamazonia.org/

FIG. 9.4 President Nicolás Maduro, kissing a gold bar in a public appearance on national television. Retrieved from Girish Gupta's Twitter account - https://twitter.com/jammastergirish/status/977279487938387969

FIG. 9.5 The leader of an armed group known as "The Union" shows his brass knuckles made of gold. Photograph taken by Meredith Kohut for the New York Times. Source: https://www.nytimes.com

9.1 – **Constraints and Difficulties**

A great deal of uncertainties and plenty of challenges difficult the implementation of a strategy in this region. It could be argued that a spatial strategy, in its purest conception, is not relevant at all. How can change be managed in such a difficult situation, considering the circumstances? How to stir the energies of the government and the local communities towards another direction when they are so engaged with an extractive model that is degrading the richness of an environment with great potential and ecological value? All these factors must be considered to ground any strategy to this harsh reality. Today, the preconditions that create a healthy implementation environment do not exist in the Venezuelan Guayana. A wide range of physical, social and political constraints, combined with the existence of underground natural resources, become the framework in which the strategy must find its way to change social behaviour and trigger the desired process of transformation.

Regarding the physical constraints, a general lack of services and critical infrastructure, or the great distances between settlements and the inaccessibility that derives from it, make this peripheral region less attractive than others for development investments. From a social perspective, the set of values and the extractive mindset that prevail also constrain the implementation of a strategy, simply because of the presence of natural resources. As stated by Bram Ebus, it is more difficult to find a bakery or a supermarket in the streets of El Callao than to find a gold merchant (2018). Especially in the cluster of towns selected as a case study for this research, both locals and working migrants choose to work in the mines, despite the extreme conditions, because there they can earn as much in a week as they would in a month in the formal economy. Today this may be true because of the grave economic crisis and the high inflation rates that Venezuela is experiencing. But It needs to be said that the creation of alternative economies will not necessarily transform the productive system of a resource-rich region if commodity prices continue to make illegal extraction a more profitable alternative for locals than the salary they could earn in a sustainable and productive economy. And finally, the absence of the rule of law discourages visitors from coming and private enterprises from investing. Violence and insecurity characterize the Venezuelan Guayana today, mainly because of the presence of organized criminals and paramilitary forces in and around the mines. But the provision of security does not depend on a stronger presence of the state through its armed forces, but on a commitment to protect the natural assets of the country. There is an important military presence in the region already, but eyewitness testimonies and a report elaborated by the International Crisis Group point out that there is an alliance between non-state armed groups and officers from Venezuela's National Guard and regional military command (2019). As mentioned above, the government is also making use of the state-owned companies to buy gold from organized criminal groups, blurring the origins of the extracted mineral and stimulating the rise of illegal mining (Ebus, 2018).

In an ideal situation, a strong and responsible government would be interested in stopping (or at least controlling) illegal gold mining operations in the region. Several attempts were made by the government of Hugo Chávez during the first decade of 2000s. First, with a social welfare program called 'Plan Piar', launched in 2003 and renamed as 'Misión Piar' in 2005 (Lozada, 2016). The plan aimed for

the sustainable development of impoverished mining communities by promoting 'environmentally-friendly' and responsible small-scale extraction. Shortly after, in 2006, the central government launched the 'Plan de Reconversión Minera', focused instead on completely eradicating artisanal gold and diamond mining throughout the region. The plan encouraged thousands of small-scale miners to abandon resource extraction and engage with other economic activities, such as agriculture and tourism. Unfortunately, the efforts were unsuccessful because of the lack of concrete alternatives and projects, and workers slowly returned to the mines driven by the profitability of this activity (Prat, 2012; Lozada, 2016). The last attempt to control illegal gold mining in the Venezuelan Guayana, launched in 2010 and known as the 'Plan Caura', mainly consisted in the deployment of military forces in the threatened areas of the Caura River basin (Lozada, 2016; Gutiérrez Torres, 2017). Since the decree of the Orinoco Mining Arc in 2016, no more efforts have been made to control or stop illegal mining in the region. On the contrary, it has created a legal framework for the illegal operations that fall within its borders and stimulates the rise of this activity.

9.2 – **The Role of the State**

The importance of creating local and sustainable economic alternatives in peripheral and remote areas of the region, to reduce the dependency of people on resource extraction, has been thoroughly argued throughout this report. But which are the responsibilities of the state in this process of transformation has not been explained in detail. Endogenous growth theory and literature on smart specialization stress the role of the state as a facilitator and suggest that it should concentrate its efforts in creating the conditions for the flourishment of local entrepreneurship. As mentioned above, the diffusion of technology, innovation and knowledge are crucial, since they allow a self-discovery process leaded by local entrepreneurs from the bottom up. By combining scientific and technical knowledge with the resources and capacities available in the region, unexpected activities will emerge (OECD, 2013). But to provide the necessary conditions for things to happen goes far beyond the act of making innovation and knowledge accessible. It also involves the improvement of security and the restoration of the rule of law, by discouraging illegal mining with incentives and sanctions; the creation of mining restrictions or bans, to prevent further social and environmental degradation; the elaboration of plans, to provide certainty and protection to private investors, but also to promote collaboration; and finally, the flexibilization and adaptation of the centralized government structures, so as to stimulate the creation of networks among stakeholders at all levels and from all sectors.

It is evident that most of the responsibilities that should be undertaken by the state do not necessarily involve the expenditure of public resources, but they rather imply the exercise of its legitimate authority in a variety of ways. In the part of the Venezuelan Guayana that has been selected as a case study, the improvement of security depends a great deal on the National Guard and the regional military, but also in local police forces. As stated, incentives and sanctions can also be created

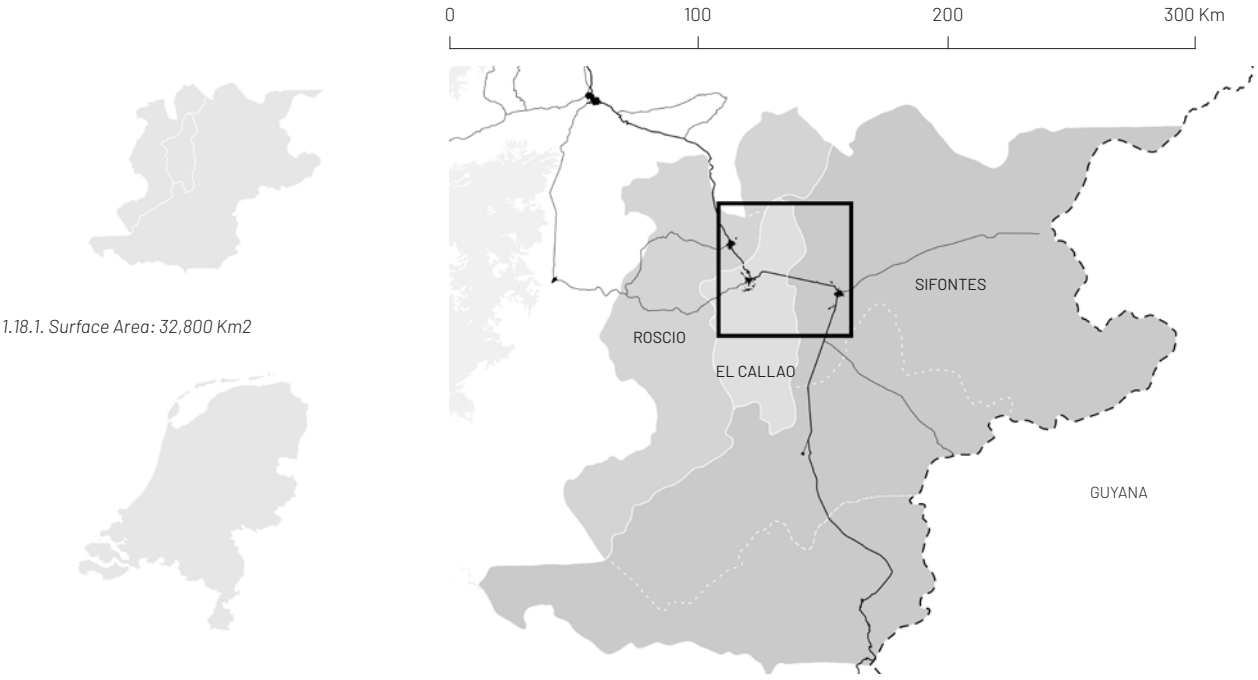


FIG. 9.6 Municipalities in the Venezuelan Guayana have enormous proportions. This has to do with the fact that most of the land is covered by large and uninhabited extensions of tropical moist forests and savannas. The population density is extremely low in the municipalities under consideration, but together, their area is almost as big as the whole of the Netherlands. Source: made by the author.

FIG. 9.7 The towns of Guasipati, El Callao and Tumeremo belong to three different municipalities, all of the within the State of Bolívar. Guasipati is the capital of the Roscio Municipality; El Callao is the capital of the homonymous local administrative unit; and Tumeremo is the capital and the largest urbanized center of the Sifontes Municipality. Source: made by the author.

to promote other activities and discourage those that degrade the environment and bring more violence. Microcredits, the flexibilization of land-use regulations, and technical support to boost local entrepreneurship could have a considerable impact in the transition of local communities towards other activities. Sanctions may be more difficult to put in place, but the withholding of public benefits with penalties and fines could be tested. Naturally, the imprisonment of the criminal organizations that are controlling the mines with violence and fear is a responsibility of the state.

Mining restrictions are also a capacity that belongs to the state, the sole owner of the underground natural resources. The annulment of the Orinoco Mining Arc would be a major benchmark. But in a scenario in which the state does not want to shift away from extraction, it would be desirable to at least prohibit mining in the protected natural areas of the region. In 2004 the national government modified the plan that regulates uses in the Imataca Forest Reserve, allowing mining activities inside (Berroterán, 2003; Lozada, 2016). This decision was ratified when the reserve was included within the boundaries of the Orinoco Mining Arc in 2016. The cluster of towns selected as a case study is located just outside the limits of the Imataca Forest Reserve. Therefore, reducing the dependence on extraction and the promotion of economic alternatives depends on the restriction of mining within the reserve and on the creation of incentives for the sustainable management of the forests. The concession of plots for experimental research on agroforestry techniques, such as the one envisioned in the strategy, is a good example on how the state could facilitate conditions for research and knowledge institutions. A report elaborated by Global Forest Watch indicates that both Fundación La Salle and the Experimental University of Guayana were applying for concessions of that sort in 2002, but an official document published a year later shows that the request made by the foundation was still under review, while no mention is given to the regional university (GFW, 2002; Berroterán, 2003).

The elaboration of a strategic plan, to activate the selected cluster of towns as a polycentric urban region, is another competence of the public sector alone. A plan is usually associated with a top-down imposition or a fixed blueprint of how the future should be; but in this case it should be understood as a flexible tool that allows stakeholders to visualize strategies in space and promotes their engagement with the long-term project. In addition, it is a legal instrument that provides certainty and protection to those interested in investing. While restoring the rule of law, restricting mining and giving concessions in forest reserves are responsibilities that lie at high levels of the central government, the elaboration of a plan for Guasipati, El Callao and Tumeremo, should be leaded by the State of Bolívar, the regional level of administration in which the towns are located. The three urban centres belong to different municipalities (Roscio, El Callao and Sifontes), and for this reason it would be desirable if the State of Bolívar assumes the leadership in the development of the plan, acting as a mediator with the local administrations. Indeed, the activation of a single polycentric entity brings new challenges that need to be addressed, such as the fostering of collaboration between settlements that are used to function independently. The plan will stimulate that cooperation, especially if it helps to evidence the attractiveness and the benefits of engaging in this joint project. Some of those benefits may include an increase in the economic competitiveness of the three towns, a greater regional status, higher taxation revenues for the municipalities, an increase in the value of land around the strategic interventions, new jobs, new land for urban development, an improvement in the quality of social, spatial and environmental conditions, and a general reduction of insecurity rates by attracting new economic activities and reducing the current dependence on mining.

At the national and regional level, ways must be found so that the three municipalities engage in the activation of the PUR. Infrastructural works aimed at enhancing the complementarities among the three centres and the development of punctual but strategic interventions are good ways to foster that cooperation. As well as the creation of appropriate incentives and sanctions, such as access to additional funding for a municipality if they collaborate in a joint project, or the withholding of that funding in case they refuse to participate. But the need for collaboration goes beyond the public sector. Both endogenous growth theory and the literature on polycentricity stress the importance of working in networks at all levels and with stakeholders from all sectors. Therefore, the adaptation and flexibilization of the existing government structure also becomes crucial for the application of this regional strategy. But it must be said that what has been described in the paragraphs above is an ideal situation, one that has a place in a scenario where the public sector shares the vision of a productive and self-sufficient region without mining -or at least with a much more diversified and sustainable economy. Is it possible to trigger a process of transformation without the total engagement of the public sector? This issue will be addressed later in this report, using one of the key projects of the strategy as an example. Before that, a brief description of how the strategy could be applied in time will be outlined, to have a better understanding of which are the trigger projects that should be prioritized in order to break the vicious cycle of dependence on extraction.

9.3 – **Trigger Projects and Strategic Interventions**

Even in a scenario in which the central government commits to stop illegal mining and generate alternative opportunities, the new activities that will emerge will be forced to coexist for an uncertain amount of time with the extractive economy. In fact, the reduction of the current dependence on resource extraction will depend directly on the growth of local initiatives and the subsequent creation of other forms of employment. But when resources are limited, it becomes indispensable to understand which are the projects that will catalyse the process of transformation. The different types of projects comprised by the strategy, aimed at activating a polycentric urban region in this peripheral part of the Venezuelan Guayana, are all framed by the general vision and aligned with the strategic goals that have been outlined for the entire region. They deal with problems of mobility and connectivity between the three urban centres; with the building of capacities and capabilities among local communities; with the diffusion of technology, innovation and knowledge throughout the territory; with the promotion of clusters with a smart specialization approach; with punctual interventions aimed at enhancing the living conditions of the three towns; and with the production of clean and renewable forms of energy to cater the demand of the new activities that will emerge.

All projects are important, and together they will contribute to facilitating conditions for local initiatives, in the promotion of new economic activities, and in the improvement of spatial and environmental qualities of the region. Some, however, are more important than others because they are required as a prior condition for a next stage of development. As mentioned above, access to innovation and knowledge is one of those indispensable preconditions, since they allow local entrepreneurs to make use of the potential that is present in the territory in unexpected ways, stimulating the development of creative and competitive initiatives (Vázquez-Barquero & Rodríguez-Cohard, 2018; OECD, 2013). Endogenous growth theory also stresses that the potential of the region goes beyond the comparative advantages of its natural assets, since human capacities and capabilities play an even more important role (Stimson & Stough, 2008; Vázquez-Barquero & Rodríguez-Cohard, 2018). Therefore, theory indicates that the projects that contribute to the building of capacities and with the diffusion of technology, innovation and knowledge should have a priority over the rest in the first stage of development. They are the catalysers of the desired process of transformation, since they create the conditions for the growth of local initiatives. In the first phase all the efforts and resources available should be targeted to the creation of the Research and Development cluster of Tumeremo, and in the provision of a system of community hubs in all three towns, to host the capacity building programmes that are needed. The concession of a plot in the Imataca Forest Reserve for experimental research purposes is directly linked to the development of the R&D cluster of Tumeremo, and only the Ministry of People's Power for Ecosocialism can grant that land. It must be said that theory on polycentricity emphasizes that connectivity among the various towns should be optimal, so that the people that live in one urban centre can take advantage of the opportunities offered in another. For this reason, the implementation of a common public transport system between the three towns is also considered as one of the trigger projects of the strategy.

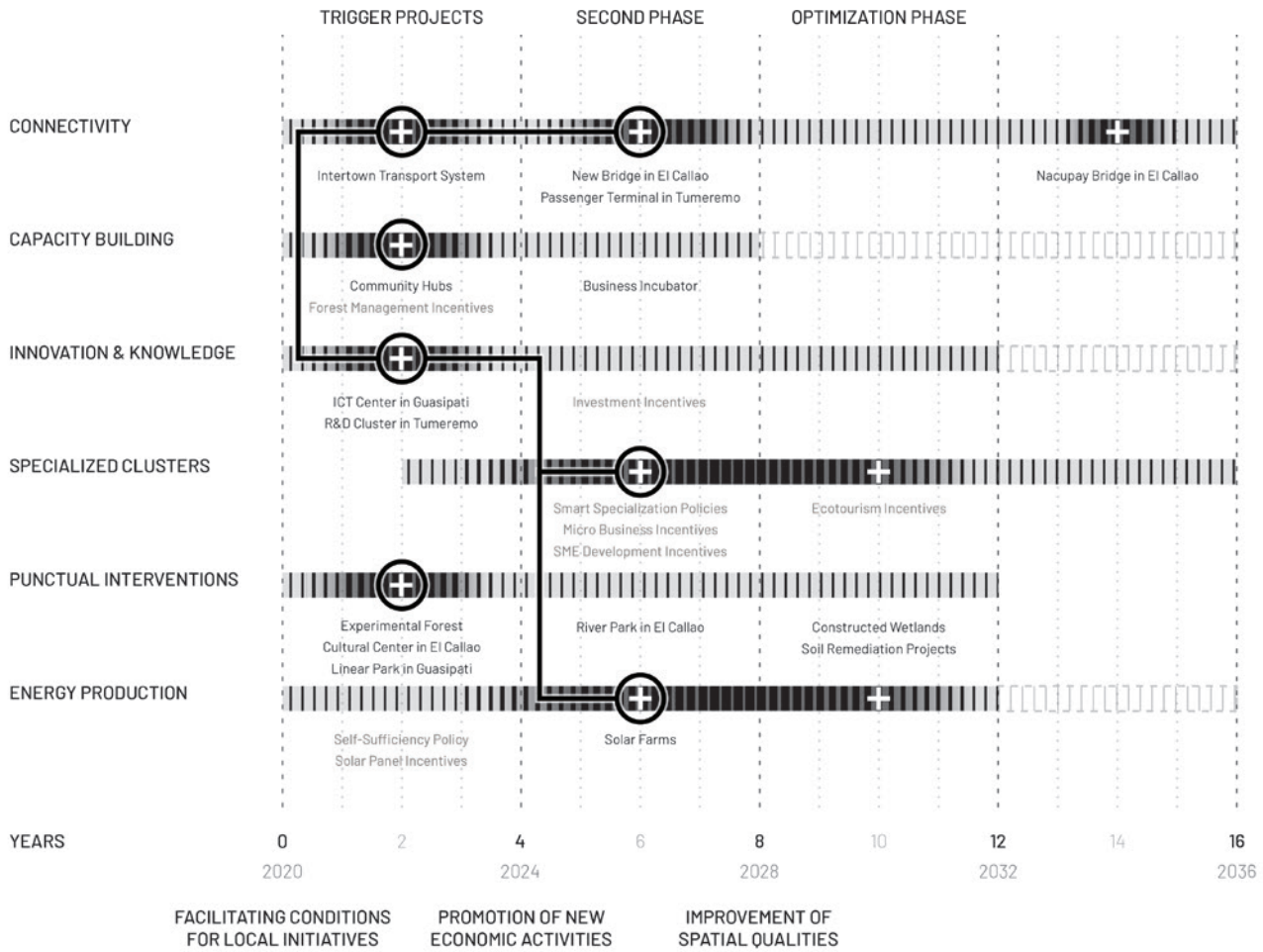


FIG. 9.8 Timeline and phasing of the strategy, with the identification of the key projects that will trigger the process of transformation. Source: made by the author.

The second phase of the strategy will only begin once a first generation has been provided with entrepreneurial capabilities and new sets of skills. The conditions for local initiatives to develop are already in place, since technology, innovation and knowledge will become accessible in the polycentric urban region. A smart specialization approach should be taken in this phase to foster the growth of the initiatives that will emerge. According to the literature on smart specialization, this approach depends completely on the self-discovery process leaded by local entrepreneurs, but also on a focus on activities rather than sectors per se (OECD, 2013). The entrepreneurial discovery process will take place on its own and from the bottom up. The Research and Development cluster of Tumeremo will discover and produce information about new activities that could be undertaken in the territory, and the government will have provided the conditions for initiatives to happen, assessing their potential and empowering the actors most capable of realizing them (OECD, 2013, p. 18). The focus on activities, rather than sectors, aims to make smarter and specialized investments, enhancing the overall competitiveness of the region. Activities can be tied to specific technologies, capabilities and natural assets, leading to a degree of specialization that would be otherwise be very difficult to pre-determine (OECD, 2013).

In this stage, the development of a manufacturing cluster in Guasipati becomes pressing, since it will provide the space to accommodate the small and medium enterprises born from the process of self-discovery. Spillover effects will be set in motion, and the growth of those specialized activities will attract other private companies seeking to take advantage of the complementarities they will bring to one another. To further stimulate the growth of this cluster and the creation of new opportunities, a variety of incentives could be created. The provision of public land to promising enterprises, funding for SMEs and innovative start-ups, and fiscal incentives, are just a few examples of how the government may be able to attract investment in peripheral areas. A business incubator, which could be positioned in the live/work environment that is envisioned, will also become an important incentive, since it will provide technical support to the emerging initiatives and stimulate the creation of networks at all levels. Energy will be much needed by the manufacturing industries, and for this reason the creation of solar panel incentives could be put in place in this second phase of the strategy, along with self-sufficiency policies, and public subsidies to facilitate the construction of solar farms, preferably on top of remediated extractive wasteland. An additional passenger terminal in Tumeremo, and the construction of a new bridge and a Cultural Centre in El Callao, are also important projects of the second phase. They are aimed at improving the connectivity among the three urban centres with new infrastructure, and to facilitate the growth of cultural undertakings around the heritage of the region.

Even though evidence-based monitoring and constant evaluation should be an important part of the strategy from the beginning, the final stages are particularly more concerned with the optimization of what has been achieved so far. Flexibility is important, and feed-back will point which capacities and skills are now required by local communities, what new activities can be fostered, and the next steps that should be taken to counterbalance the presence of the extractive economy in the region. In a scenario where security has improved because of the successful creation of new opportunities, incentives for the development of a strong ecotourism sector can be created. Some examples may include the provision of credits and microcredits to upgrade existing buildings into small lodging establishments, or funding and technical support for the creation of small tourism ventures. In addition, punctual interventions aimed to improve the environmental and spatial qualities of the three towns are also envisioned in this phase. New public spaces, the creation of constructed wetlands for the treatment of polluted waters, and soil remediation projects on abandoned mining areas become more relevant now, since the conditions for the generation of new opportunities already exist. Naturally, all the projects in the strategy involve a wide range of stakeholders to be successfully carried forward. To illustrate the relations within a network structure and the processes that take place in a collaborative platform, the Research and Development cluster of Tumeremo will be used as an example.

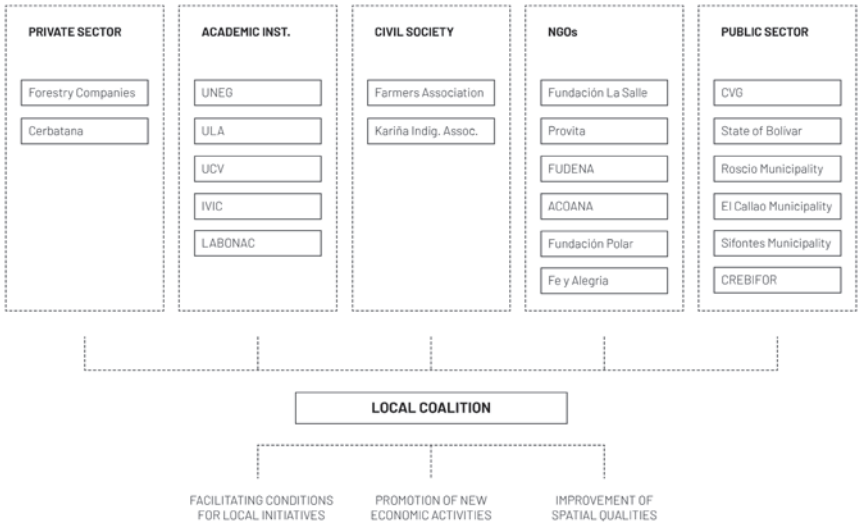


FIG. 9.9 Organizational chart of the actors that constitute the local coalition, created for the development of the R&D cluster in Tumeremo. Source: made by the author.

9.4 – **Local Coalitions as a Useful Model**

As mentioned above, the strategic project that envisions a Research and Development cluster around the existing Frontier Campus of Tumeremo, will be used as an example to illustrate how change may be triggered by working in networks and by promoting collaboration among stakeholders, at all levels and from all sectors. Along with the capacity building programmes and the implementation of a common transport system, this is one of the key projects of the strategy. It has been stated that the central government plays a crucial role in facilitating preconditions, but there are plenty of other stakeholders involved in this project, with different types of resources and relative degrees of power. The challenge is to combine those stakeholders and their resources in a way that can enable the activation of this project.

An effort has been made to identify the range of possible actors involved, and more than 35 stakeholders from all levels and sectors were individuated [Table 9.1]. The list includes international agencies interested in the protection of the Amazon rainforest; academic institutions, research centers and environmental NGOs; local, regional and national civil society organizations with a variety of interests, which go from scientific research to the safeguarding of private interests or the preservation of indigenous heritage; national and international private companies that deal with non-timber forest products; an array of governmental organizations that includes the Ministry of People's Power for Ecosocialism, the National Science, Technology and Innovation Fund, an important regional development corporation with two of its state-owned companies, the National Institute of Agricultural Health, the National Guard, the regional government and the three municipalities involved. Last but not least, a variety of threat promoters was also included in the list. Poachers, loggers, and miners will be in conflict with the interests of this project; and mining criminal organizations in particular have an important amount of power.

Example of a Stakeholder Ecosystem

TABLE 9.1 An effort has been made to identify the range of possible stakeholders involved in the development of a Research and Development cluster in Tumeremo, around the existing Frontier Campus managed by Fundación La Salle.

STAKEHOLDERS IDENTIFIED FOR THE DEVELOPMENT OF THE R&D CLUSTER

TYPE	STAKEHOLDER	LEVEL
International Cooperation	Global Forest Watch (GFW)	International
International Cooperation	World Resource Institute (WRI)	International
International Cooperation	Conservation International (CI)	International
International Cooperation	Global Environment Facility (GEF)	International
International Cooperation	UN - Food and Agriculture Organization (FAO)	International
NGO	ACOANA	National
NGO	Provita	National
NGO	FUDENA	National
NGO	Fundación La Salle	National / Local
NGO	Fundación Empresas Polar	National
NGO	Fe y Alegría	National / Local
Civil Society Organization	Small-Scale Farmers Association	Local
Civil Society Organization	Kariña Indigenous Peoples Civil Associaction	Local
Academic Institution	Universidad Experimental de Guayana (UNEG)	Regional / Local
Academic Institution	Universidad Central de Venezuela (UCV)	National
Academic Institution	Universidad de Los Andes (ULA)	National
Academic Institution	Universidad Simón Bolívar (USB)	National
Academic Institution	Venezuelan Institute of Scientific Research (IVIC)	National
Academic Institution	LABONAC	National
Private Company	Cerbatana	National
Private Company	Forestry Companies	Regional / Local
Private Company	DHU-Arzneimittel GmbH	International
Private Company	Melvita	International
State-Owned Company	CVG - Imataca	Regional
State-Owned Company	CVG - Minerven	Regional / Local
Public Sector	Ministry of People's Power for Ecosocialism (MINEC)	National
Public Sector	Reg. Biodiversity and Forest Research Ctr. (CREBIFOR)	Regional
Public Sector	Ntl. Institute of Integral Agricultural Health (INSAI)	National
Public Sector	National Guard	National / Military
Public Sector	Ntl. Science, Technology and Innovation Fund (FONACIT)	National
Public Sector	Corporación Venezolana de Guayana (CVG)	Regional
Public Sector	State of Bolívar	Regional
Public Sector	Sifontes Municipality	Local
Public Sector	El Callao Municipality	Local
Public Sector	Roscio Municipality	Local
Threat Promoters	Artisanal Miners and Mining Companies	Local
Threat Promoters	Poachers	Local
Threat Promoters	Illegal Loggers	Local

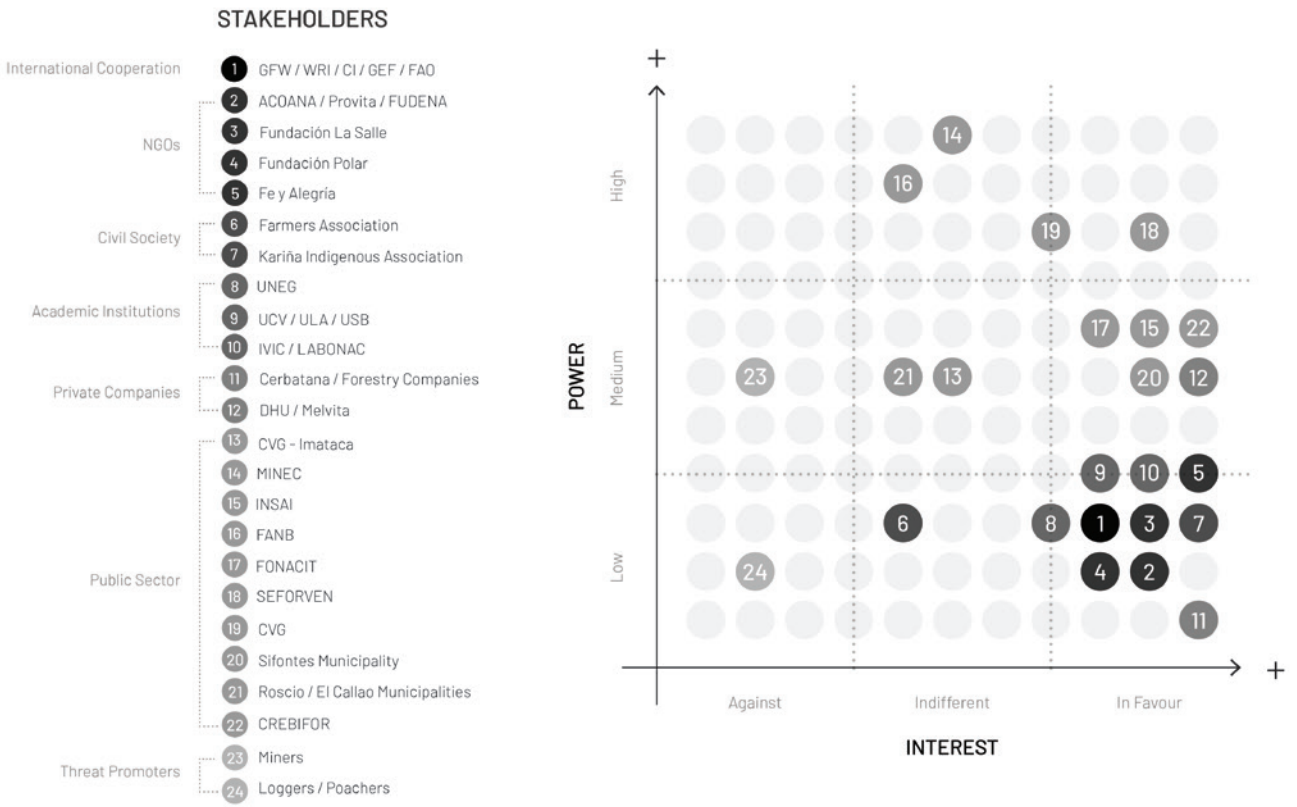


FIG. 9.10 Power-Interest matrix that evidences the relations among the 37 actors that could be involved in the development of an R&D cluster in Tumeremo. Source: made by the author.

When the power-interest relations among the actors is evaluated, it becomes evident that those who support the project are actually the ones with less power. In an ideal situation, the public sector would be interested in the development of the R&D cluster because it would stimulate local sustainable development while promoting the decline of illegal mining and the improvement of security in the region. Today, however, the government is encouraging legal and illegal mining in the Venezuelan Guayana and will probably be indifferent to the idea of facilitating accessibility to innovation and knowledge. Nevertheless, the analysis of the comparative references throughout the Americas showed that there are many sources of power. NGOs and civil society organizations can also have a profound impact and bring structural change if they manage to influence the public opinion, creating awareness through media and providing arguments to break the vicious cycle of extraction. If all the stakeholders interested in the project join their efforts and make a coalition for combined action, the balance of power will inevitably change. It could even create an important pressure on local governments, persuading them to collaborate and engage with the larger vision. The coalition also creates a strong leadership, with the task of delivering a specific objective. The best scenario includes an active participation of the local governments in the coalition, and for this to happen it is important to indicate the benefits that will derive from the project. A good argument may be provided by showing what the public sector can gain by working in networks and by facilitating collaboration among stakeholders.

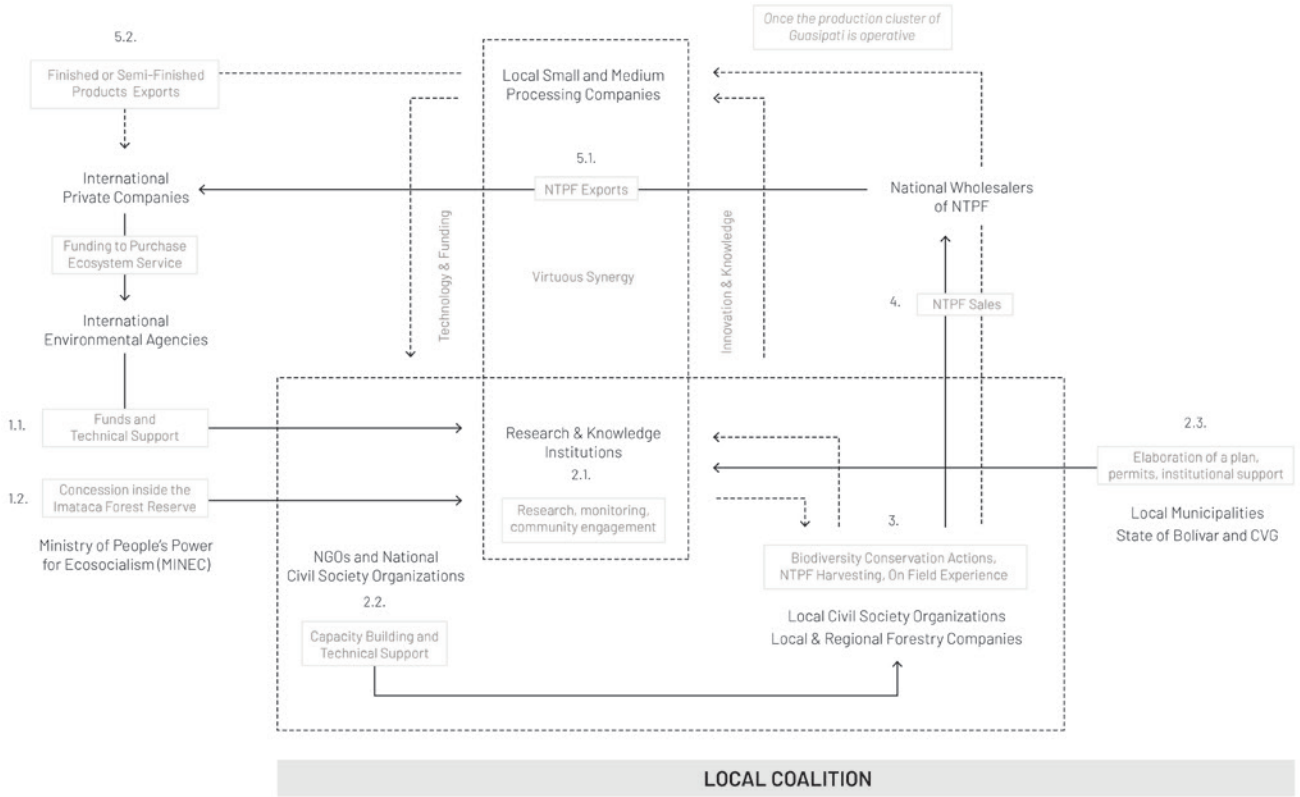


FIG. 9.11 Diagram that illustrates the process, roles and relations among the different stakeholders for the development of the R&D cluster in Tumeremo, in an ideal scenario. Source: made by the author.

The local coalition will be constituted by the academic institutions and research centers that will choose to participate in the cluster, but also by a number of environmental and educational NGOs, by private companies interested in the non-timber forest products of the forest reserve, and by local civil society organizations. As stated, it would be desirable to count with the participation of the local governments, but also with the local entrepreneurs that will progressively emerge in the region. Therefore, the coalition should be seen as a flexible and open institution capable of adapting to the changes that will take place over time. But if the municipalities are indifferent to the project in the beginning, because its interests are in conflict with the extractive economy from which they benefit, a strategy can still be set in motion to develop the project by working in networks that go from global to local.

Taking from the model used by PhyNatura, a Conservation Agreement could be signed between the coalition and an international environmental agency for the safeguarding of a specific part of the Imataca Forest Reserve. This agreement is an incentive-based approach developed by trans-national NGOs, and provides local actors with external funding in exchange for their commitment to preserve the quality of the environmental services of the forest. The coalition will now have resources to perform research and experiment with sustainable agroforestry techniques, but also to build capacities among local civil society organizations and forestry companies that are actively engaged with the project, since they will

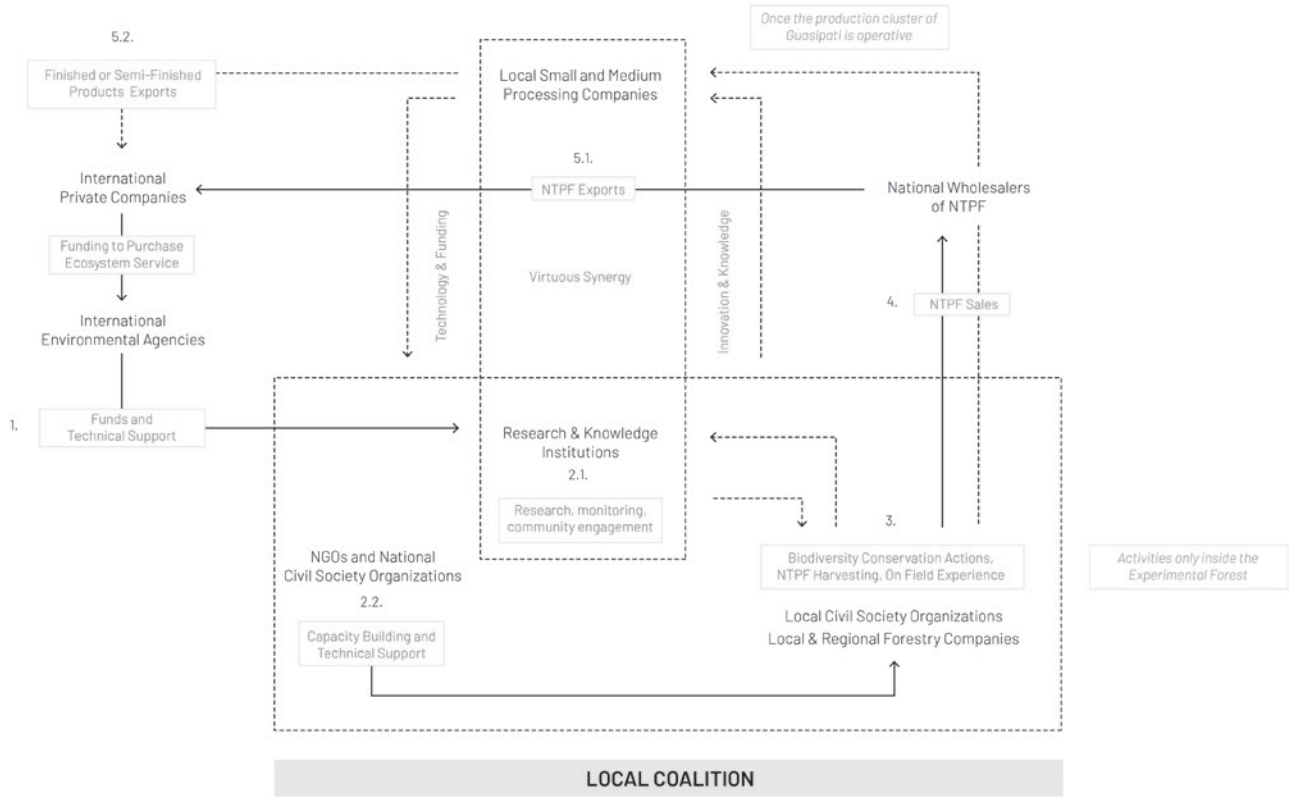


FIG. 9.12 Diagram that illustrates the process, roles and relations among the different stakeholders for the development of the R&D cluster in Tumeremo, in a probable scenario considering current implementation environment. Source: made by the author.

be in charge of harvesting the non-timber forest products (NTFP). The capacity building programmes and the necessary technical support to those local actors could be managed by the environmental and educational NGOs involved in the partnership. The harvested goods will then be sold through an intermediary to international private companies that processes them, such as DHU, a major German manufacturer of homeopathic products. In the financial scheme, the resources for the Conservation Agreement actually comes from the international private companies that require specific NTFP. Agencies like Conservation International simply facilitate the links between the local actors and the global market and mediate in the provision of the funding. In a second phase of the strategy, once the entrepreneurial self-discovery process has been set in motion and SMEs begin to allocate their operations in the manufacturing cluster of Guasipati, an important part of those NTFP could also be processes locally to create added value.

To conclude, it would be safe to assume that at some point during the process, the local governments will realize the potential benefits of taking part of the coalition. They will understand that by working in networks and promoting collaboration, processes of transformation can be triggered without making use of large amounts of public resources, but rather by facilitating conditions with their legitimate authority. Once this happens, it will be easier to count with a greater support from the public sector, and a productive and self-sufficient region will grow.

9.5 – **Assessing the Impact of the Strategy within the PUR**

As mentioned above, even in the most optimistic scenario the new activities that will be generated will be forced to coexist for an uncertain amount of time with the extractive economy. But to understand to what extent the application of this regional strategy may contribute to the reduction of its current dependence on mining, it is important to make a more rational assessment of its impact over time. If the strategy is set in motion, how many years will pass before other forms of employment outweigh mining? Can this really happen? Are mining bans a feasible option for the region from the beginning? An evaluation needs to be made to avoid broad assumptions and to measure how many green jobs can actually be created.

According to Renner, Sweeney & Kubit, a green job is a form of employment that contributes to preserving or restoring environmental quality while avoiding future damage to the ecosystems of the planet (2008). These jobs can be related to agriculture, forestry, manufacturing, ecotourism, and research and development; but also, to the related administrative and service activities that depend on those sectors, both upstream and downstream. In the regional strategy that has been presented in this report, the creation of the conditions that facilitate the generation of those green jobs has been the main object of concern.

For this reason, an evaluation has been made for the cluster of towns selected as a case study, since it needs to be clear if the strategy can positively answer the research question that has been made at the beginning of the research. To do this, the different forms of employment explored within the PUR have been measured individually, benchmarking their specific potential to comparative references from around the world. The results are nothing more than "guesstimations" for the future of the Venezuelan Guayana, since it is extremely difficult to predict what will happen in such an uncertain context. But these numbers could be taken as an approximative reference of what may be achieved, and they are certainly helpful to assess the impact of the strategy. The forms of employment that have been benchmarked in this work include public transportation, sustainable forest management, research and education, ecotourism, energy production, manufacturing, and related services.

Public Transportation

The American Public Transportation Association states that for every billion US dollars spent in public transportation, fifty thousand jobs are created (APTA, 2014). And according to an article published online on C40 Cities, a bus rapid transport system was recently built in Jakarta at a cost of $2 million US dollars for every kilometre (2012). These relations were extrapolated to the context of the selected case study, where 58 kilometres separate the main passenger terminal of Guasipati and the proposed terminus that will be located next to the Frontier Campus of Tumeremo. Approximately 116 million dollars would be needed to implement a similar transport system, creating and supporting more than 5,000 new jobs for the inhabitants of the PUR.

Forest Management

Regarding the creation of green jobs related to sustainable forest management, the experience of PhyNatura was used to benchmark the potential for similar activities inside the Imataca Forest Reserve. According to PhyNatura, 84 families benefit from the conservation agreement that was signed with Conservation International, which comprises 148,000 hectares of tropical forests in the lower Caura basin. Two scenarios were extrapolated from this figure: a cautious one, in which the Ministry of People's Power for Ecosocialism (MINEC) gives to Fundación La Salle a new concession inside the forest reserve with a surface area similar to the one it used to have in the past; and an optimistic scenario in which a much larger surface area is taken into account, comprising the forested basins of the nearby rivers inside and outside the forest reserve. In a technical report elaborated by José Luis Berroterán for the former Ministry of Environment and Natural Resources in 2003, it is mentioned that the concession that Fundación La Salle operated inside the forest reserve had a surface area of 130,000 hectares (2003). If a similar concession is given to the Frontier Campus, only 300 new jobs might be created. But if we consider the possibility of managing the forested basins of the nearby rivers, which account for almost two million hectares, around 4,000 green jobs in the forestry sector could be created. These jobs would be related to the harvesting of NTFP, agroforestry, reforestation and afforestation. To make a rough evaluation of the impact of the strategy, an average was made between the two scenarios.

Research & Education

To understand how many jobs could be created with the R&D Centre in Tumeremo, but also with the system of community hubs in all three towns, a very simple extrapolation was made. The strategy was benchmarked against the number of jobs created in research and development by Nestlé, a company that employs 4,800 people in more than 40 research centres around the world. If a median is calculated, each centre has an average of 120 researchers. There is only one research centre within the PUR, but in the Frontier Campus and the community hubs there are also educational jobs to be created. For this reason, a rough estimation of 300 new jobs related to research and education was made for the case study.

Ecotourism

Literature on ecotourism tends to emphasize the positive benefits of this sector on employment generation for local communities. But assessments are usually made at the national level, making it very difficult to extrapolate those figures at a smaller scale to and make a rough estimation for this case study. But according to Amir Miri, an Iranian entrepreneur who won the UN World Tourism Organization award for excellence and innovation in tourism in 2011, he was been able to create a dozen of direct and around twenty indirect jobs with a cottage he opened in Fars Province (Fallah, 2017). If we use this example to benchmark the strategy, a hundred ventures would be needed to create 3,000 new jobs in the PUR. This number includes both direct and indirect jobs, and not all ventures would necessarily be lodging facilities.

Energy Production

Energy production is one of the most promising sectors of the strategy. To understand its capacity to generate new jobs, the experience of Germany on solar energy production was used as a comparative reference. According to the report on green jobs produced by the Worldwatch Institute, and to figures presented by the German Federal Ministry for Economic Affairs and Energy, in Germany there were 5,400 direct and indirect jobs related to the production of 35 GWh of solar power in 1998 (Renner, Sweeney & Kubit, 2008; BMWi, 2019). For the selected case study, two scenarios were considered: one in which enough solar power is produced to fulfill the demand of all the new micro businesses inside the production cluster; and another one in which at least 10% of the household electricity consumption of the PUR is supplied by solar farms. If the production cluster has the capacity to accomodate 280 micro businesses, and the annual electricity consumption of this type of initiative may reach 15,000 KWh, it is possible to estimate that around 650 new jobs could be created by this sector. The other scenario contemplates the production of solar energy for 6,700 people within the PUR. Considering that Venezuelans have an average energy consumption per capita of 2,658 KWh (OECD/IEA, 2014), in this scenario more than 2,700 new green jobs would be created to cater that demand. For evaluation purposes, an average was made using the two scenarios.

Manufacturing

How many jobs can be created by manufacturing depends on the size of the enterprises that will be accommodated in the production cluster. Again, two scenarios were considered to assess the selected case study. One with 280 micro businesses where manufacturing is integrated to small single-family housing units, and another with 35 small and medium enterprises instead. According to the European Commission, micro enterprises have less than 10 workers, small businesses employ between 10 to 49 people, and medium-size enterprises have more than 50 but less than 250 persons employed (2011). In the first scenario, which measures the impact of a dense micro business cluster, between 1,400 and 2,800 new jobs could be created in Guasipati. In the second scenario, where 35 small and medium enterprises are accommodated instead, between 1,750 and 3,500 new jobs could be created, depending on the size of the businesses. For evaluation purposes, an average of 2,300 new jobs was calculated using the two scenarios.

Services

All these forms of employments have spillover effects and generate new jobs, mostly in the tertiary or service sector. From logistics to advanced business services, there is a wide range of activities that will support the new local initiatives in one way or another. It is difficult to estimate an approximate number for the indirect jobs that may be created in the service sector. For this reason, and for evaluation purposes only, the total amount of jobs that has been benchmarked to this point was multiplied by a coefficient of 0.3. The result of this rough calculation is an impressive number of 4,400 new jobs within the PUR, making this one of the most dynamic sectors in the strategy.

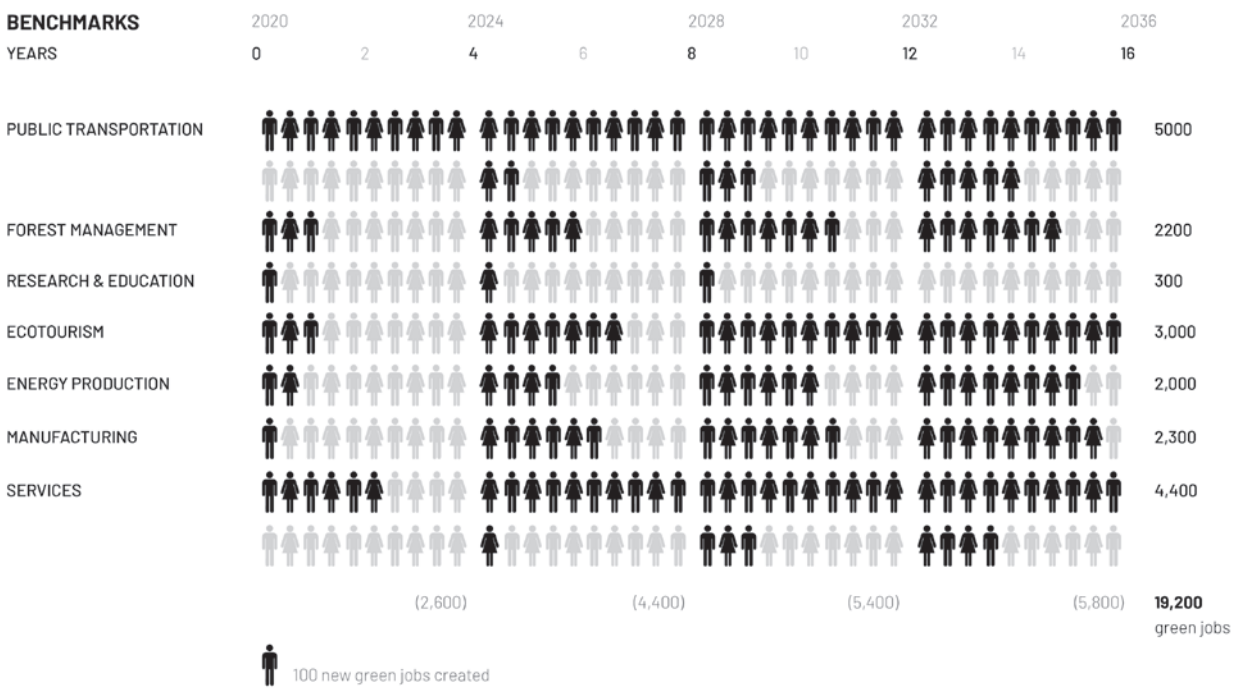


FIG. 9.13 Benchmarking and performance evaluation of the strategy, to understand its capacity to create new forms of employment in the selected case study. The diagram shows the number of green jobs that can be potentially generated by each type of employment over time. Source: made by the author.

Overall, and according to the benchmarking evaluation that, the strategy for the selected case study could contribute to the creation of almost twenty thousand new green jobs over the course of sixteen years. These jobs would be created progressively and in relation to the implementation of the strategic interventions described above. These benchmarks are only estimations of what is possible, since it is extremely difficult to predict what will happen in the future. One important conclusions that can be made from this assessment, is that although the number of jobs that may be created is not insignificant, it only accounts for 28% of the total population of the PUR. The actual number of people that depend on the extractive economy is hard to assess, but an employee of Minerven says that there are 30 thousand miners working the gold veins of El Callao and its surrounding (Ebus, 2018). How many of these miners are locals and how many are migrant workers is difficult to know. But dependence on mining can take many forms, since this economy supports a wide range of activities that go from cooking and transportation, to prostitution and marketing intermediary services, among many others.

In other words, the strategy is unable to substitute completely the current dependence of locals on the extractive economy, since it only offers an alternative form of employment to half of the working force of the three towns. Therefore, the creation of sustainable alternatives must coexist with the extractive economy for an uncertain period of time. This does not mean that the strategy fails to accomplish its main objective, but that it is rather the design for a transition towards a more sustainable future. It provides enough elements to reflect on why it is important to promote local sustainable development in peripheral and remote areas, and manages to provide valuable insight on which activities should be prioritized over others, and where and how resources could be destined in the future.

PART 5

Reflection

Closing comments and some recommendations

“Nunca encontramos el Graal.
Los relatos no eran verídicos.
Solo la fatiga de los caminos acompañó
a los que se aventuraron,
pero se esperaban historias,
¿qué sería nuestro vivir
sin ellas?

Nada se resolvió,
hubiéramos podido quedarnos en casa.
Es que somos tan inquietos.
Sin embargo, conlcuido el viaje
sentimos que en nosotros
—ya no rehenes
de la esperanza—
había nacido
otro temple.”

[Rafael Cadenas • La Búsqueda, Poemas Selectos]

10 – Reflection

The role of urbanism in peripheral, resource-rich regions

Throughout this research, a number of considerations and several conclusions were made. Some have to do with the relevance of some findings for the construction of possible futures in Venezuela; others deal with the role of urbanism in peripheral and remote areas, since they appear like territories where other professions are more relevant because of the apparent lack of an urbanism dimension; and finally, some reflections were also been made regarding the difficult but always inspiring challenge of operationalizing theories that come from other fields, in order to give them a spatial dimension. These reflections will be commented in the following pages, and then some recommendations will be made for future research by others.

The decision to use an extreme scenario in this research opened a wide range of possibilities to support local sustainable development in the Venezuelan Guayana. These possibilities would not have been explored with the same care if one simple question had not been put forward from the beginning: what if a resource-rich country like Venezuela says no to mining? To not engage in resource extraction, knowing that there are plenty of natural resources underground, is a big and difficult decision for a developing country. Especially if more than 80% of its population lives in poverty, and the national economy has depended on oil extraction for more than a hundred years. But a benchmark evaluation against some comparative references, and the discovery of successful initiatives like PhyNatura, contributed to the understanding that there are plenty of opportunities for the construction of an alternative development path in this region, which can be as productive as it is sustainable. But for this to happen, awareness needs to be created among the population and in close cooperation with NGOs and civil society organizations.

Many in Venezuela will probably resist a vision that aims to ban resource extraction. These people usually argue that mining revenues are much needed for the diversification of the national economy and the alleviation of poverty. This may be true, since countries like Chile or Norway have managed to improve the living conditions of their people with the creation of stabilization funds from mining operations. But this research helps to clarify that poverty and lack of opportunities can also be overcome in a sustainable way, and that local communities can play an important role in the national economy even if they live in peripheral contexts. Mining might not be banned in the short or medium term, but the design of a transition towards a more sustainable future becomes crucial for a number of reasons. First, to reduce the vulnerability of resource-regions and their populations to the fluctuations of the global market; second, to preserve the rich diversity of the Venezuelan Amazon and its indigenous populations; third, because non-renewable resources will be unavoidably depleted one day; and fourth, to become more productive and competitive in a globalized world, since non-renewable resources might not be as valuable as they are today in the future.

The role of urbanism in this transition is not obvious to all, since many sensitive and extreme narratives collide in the Amazonian context. Because of the important presence of large indigenous populations in remote and peripheral areas, any attempt to improve their living conditions may be seen as an imperialist and colonizing act to many; to introduce a productive dimension in natural protected areas, even if it is based on the sustainable management of forests, will be in conflict with traditional notions of preservation; and the idea of banning or regulating mining, as mentioned above, will have fierce opponents in an country with a long extractive tradition. In this difficult context, the question put forward by Pike, Rodríguez-Pose and Tomaney (2007) becomes more relevant than ever: what kind of local and regional development should be promoted, and for whom? As Bram Ebus states in a recent article for The Guardian, the forgotten parts of southern Venezuela are of key importance to the political future of the country and need to be taken into account (2019). Not only because of the current presence of organized criminal groups in those territories and for the restoration of the rule of law, but to integrate them to the national economy and trigger a transition towards a more sustainable future. The Venezuelan Guayana is such a vast region, that if efforts and resources are only invested in the large cities of the north, the impact of that type of development will probably be very weak in peripheral and remote areas where alluvial gold placers and gold veins are abundant. Therefore, the generation of alternatives for those communities must be approached locally.

It is extremely important to facilitate the conditions for endogenous growth in remote and peripheral areas of the Venezuelan Guayana, so that the transformation process can take place from the bottom-up. On the one hand, local sustainable development can help to overcome the current dependence of many communities on resource extraction; and on the other, it may also contribute in the reduction of deforestation rates south of the Orinoco River. If the sustainable management of renewable resources is prioritized over the exploitation of non-renewable ones, then the Amazon rainforest can support a wide range of highly specialized economies while guaranteeing its preservation in the long-term. In other words, development and preservation are not necessarily in conflict. The introduction of a productive dimension in the management of natural protected areas, along with the enhancement of human capabilities and the provision of new skills, might facilitate remote and peripheral communities to take part of global value chains without diminishing the quantity and the quality of the ecosystem services provided by the natural system. This paradigm shift will also help to improve the spatial and environmental conditions of urbanized areas, since it establishes a new way of living with nature that also goes beyond the boundaries of natural protected areas.

To explore the spatial dimension of an economic strategy is always a challenge for an urbanist, but it becomes even more important in remote and peripheral areas, since distances are great between most settlements and population densities are usually low. Most strategies, policies and interventions are always full of good intentions; but if accessibility is not good, investments are made in an unsuitable location, the affordances of the spatial structure are not considered, and uncertainty is not taken into account when elaborating proposals, all efforts might be lost. Space matters, all the way from the regional scale up to the site of a punctual intervention. And it matters because to understand what to do in space, where to do it, and how to it, can have a profound impact.

This research evidenced that by taking advantage of the affordances offered by existing morphological conditions, the economic performance of some settlements can be greatly increased, even in remote and peripheral contexts. The clustering of centres of the selected case study allowed to make use of polycentricity theory to boost its competitiveness and strengthen the local process of development. If the latent potential of that spatial structure would not have been considered, an opportunity would have been missed. To work with the affordances of the existing built fabric is at the base of good urban design. But the exploration of different alternatives for the production cluster showed that the creation of new affordances might be just as important, especially in contexts where uncertainty is great. If the support of the central government is weak, the area is not attractive for private investments, and the arrangement of stakeholders involved is not clear, the design of a flexible an adaptive spatial framework becomes crucial. Otherwise, the project will probably fail due to its rigidity and subsequent inability to adapt to changing circumstances. At the small scale, where things are incredibly concrete, design should contribute to the creation of open-ended designs that create affordances and multiple possibilities. This means that designers should concentrate their efforts in understanding what should be fixed and which are the spaces that allow a higher degree of freedom, rather than saying how things should be done from the top-down.

10.1 – **Some Recommendations**

The regional scale analysis presented in this research [Part 2, Chapter 4] made a broad categorization of the region, measuring the degree of peripherality of the smallest administrative units using a series of indicators. This analysis should be done more thoroughly by others in the future, not only for the Venezuelan Guayana but for all the country and making use of more indicators. According to the peripherality index map that was elaborated, the Venezuelan Guayana may be divided into three types of sub-regions: integrated, peripheral or remote areas. Due to time limitations, this research only worked a case study in one of many peripheral areas, in order to make a multi-scalar exploration. But to have a better understanding of the different challenges and opportunities for local sustainable development, further research should to be done by others in the future in other parts of the region.

The northern parts of the Venezuelan Guayana, where the larger cities are located, are more integrated to the national economy and have better access to basic services. The type of local development that can be promoted in those cities and throughout the surrounding towns and villages that depend on them will be very different to the one that has been explored in this work. The same goes with the remote forested areas of the Venezuelan Guayana, which account for a large part of the State of Bolívar and most of the State of Amazonas. The dispersed and very small settlements of these sub-regions can only be accessed by road or by plane, and there is an almost absolute lack of services and basic infrastructure. In addition, these are areas where indigenous populations have a more important presence, and most of their surface are legally protected. Further research in these extreme areas is critical, because alternatives for local sustainable development are also

necessary for these communities. The pressures and externalities of resource extraction can also be felt here; and in many cases, mining is being performed in a destructive manner by indigenous communities themselves, making use of mechanical equipment and poisonous metals (Lozada, 2017). Finally, more research should be done in other peripheral areas of the Venezuelan Guayana. Even though this work focused in of those sub-regions, the spatial characteristics of the existing clustering of centres was very site-specific. Similar approaches could be explored in other clusters of the region, but there is also room to work with other models where existing spatial conditions do not support the activation of a polycentric urban region. For example, the core-periphery model should be tested in peripheral areas where one urbanized centre dominates the surrounding settlements. This situation can be found in the Gran Sabana Municipality, where the town of Santa Elena de Uairén has a greater attraction capacity than the nearby villages.

As stated in the introduction, one of the biggest challenges of this research was the lack of official data. Those who intend to work in peripheral and remote regions of the developing world, like the Amazonia, will have to deal with the lack of basic information that is given for granted in other contexts. If a regional strategy is to be developed for the Venezuelan Guayana, it becomes imperative to elaborate a thorough and reliable dataset for the entire territory. A consortium of civil society organizations from Amazon countries known as RAISG (Amazon Geo-Referenced Socio-Environmental Information Network) is making an incredible effort to produce and disseminate knowledge, statistical data and georeferenced socio-environmental information on Amazonia with a common criterion. This comprehensive work provides a very good starting point to work in this part of the world at the regional scale, but the lack of data to work at the small scale with a systemic approach remains a major issue. Of course, any future research on this region should be complemented with fieldwork and direct experience, a privilege that this research did not have due to the political and social situation that Venezuela is currently living. To facilitate multiscalar approaches and explorations, a reliable and complete dataset for the region that includes its towns and villages should be built and made public. Otherwise, it is highly probable that the projects that might be made in the future will remain either too abstract (because of their inability to understand the differences and specificities of the territory in a sensitive way) or too specific and short-sighted (because of their inability to understand places in a systemic way and to lack of information). It has been argued that urbanism does have a role in the exploration of possible futures for the Venezuelan Guayana, but for this to happen in a meaningful way information needs to be built first.

One last but important recommendation will be given for future investigation. The impossibility of this work to perform field research limited a more meaningful exploration of the small scale and its possibilities. It would be interesting to work the other way around, scaling up from the interventions in local communities and trying to understand their systemic impact at the regional scale. To begin with an analysis of the small-scale, and to complement the exploration of local interventions with a serious and constructive fieldwork, will contribute greatly with valuable qualitative research to future investigations on the role of urbanism in the Amazon context.

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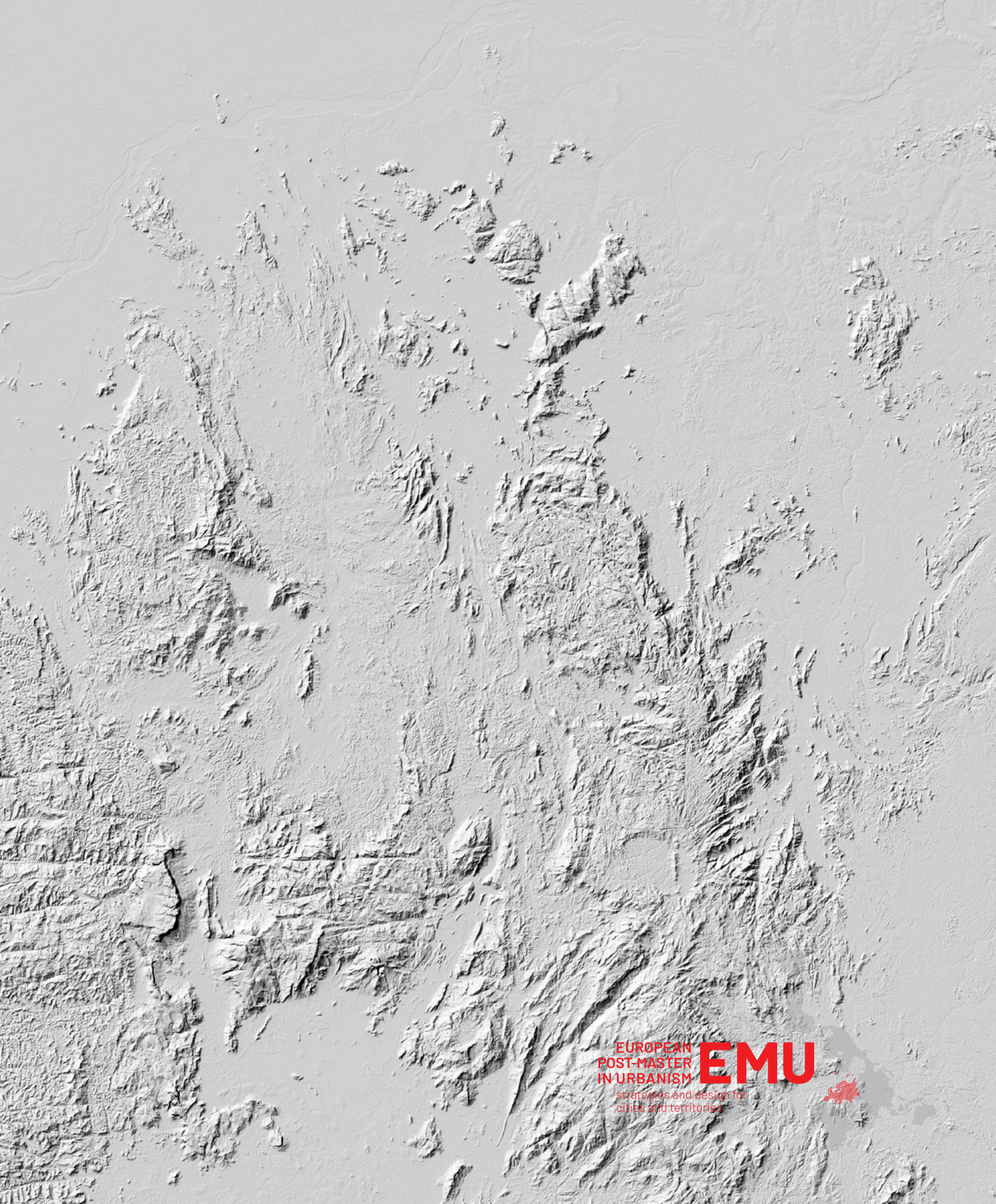
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